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Rocks and Minerals

Official Journal of the Rocks and Minerals Association

A Magazine for Mineralogists, Geologists and Collectors

June, 1947

35c

Vol. 22, No. 6 Whole No. 191

13th List of Minerals from an Old Collection

GOLD, Vorospatak. Pure xld. aggregate about ⅜ in. $15.00
GOLD, Ibex Mine, Colorado. Fine xld. mass about ⅝, no gangue 15.00
GOLD, Colorado, Bright xld. wires on Quartz. 2x1½ 15.00
GOLD, Colorado. Small visible masses in Quartz. 2½x1¾ 2.50
GOLD, Klondike. Visible masses in milky Quartz. 2½x2¼ 6.00
GOLD, Botes, Hungary. Micro. xld. mass with some matrix, 1x1⅛ in.... 17.50
GOLD, California. Small nuggets from placers. 9 grms. 15.00
GOLD, Vorospatak. 15 small xld. aggregates & wires in Riker mount 25.00
GOLD, Bullfrog Mine, Nevada. Finely disseminated in Quartz enclosing Chrysocolla, polished. 2½x2x1½. Visible Gold, but not very rich .. 2.50
FLUORITE, Cumberland. Group of lilac xls. 3x2½. Fl. under LW. 2.50
CINNABAR, California. W. some Serpentine. 2¼x1¾. (5 oz.) 2.00
BARRANDITE, Nevada. Vein in rock. 3x2½ 2.00
ZEUNERITE, Schneeberg. Minute xls. on rock w. Pitchblende. 3x2 .... 3.50
DEWEYLITE. Tweedsville, Pa.. Minutely botryoidal & massive. 3x2 .... 1.50
VONSENITE, California. Granular xlline. mass. 3x2x2 ..... 1.50
SCHEELITE, Nova Scotia. Crude xl. and masses in Quartz 2½x2¼ 2.00
LIVINGSTONITE, Mexico. Xlline. mass. 3x2½ 5.00
AMBLYGONITE v. MONTEBRASITE, France. Massive. 2½x2⅛ 1.00
COLLINSITE, British Columbia. With Quercyite, 3x2 ..... 1.25
COBALTITE, Tunaberg. Very fine large twin xl. ⅞x½ inch 8.00
SPENCERITE, British Columbia. Pure xlline. mass. 2x1½ 5.00
AZURITE, Bisbee. Drusy xls. on bright blue mass. 3x3x1½ 4.00
MICROLITE, Virginia. Good 5/16 inch xl. in Albite. 1½x1 ..... 1.50
CORUNDUM, No. Carolina. Pink xlline. mass, bright fl. under LW. 2x2 .. 1.50
LEAD, Langban. Fine group of crude xls. 2¾x1¾. No gangue, rare 20.00
FLUORITE v. ANTOZONITE, Canada. Dark purple xlline. mass. 3x2 .... 1.25
PSEUDOMALACHITE (LUNNITE), Rheinbreitbach. Xld. & xlline. 3x2 .. 3.50
GYPSUM v. SATINSPAR, Nottinghamshire. Fibrous xlline. 4x3 ..... 1.50
ARSENIC, Andreasbery. Fine mammillary mass. 2¾x2¼ 3.00
ALLEMONTITE, Allemont, France. With Arsenic. 3x2¼ 3.00
TENORITE v. MELACONITE, Michigan. Massive. 2x2 ..... 1.50
APATITE, Maine. In large lilac xls. with Cookeite. 2x1½ 4.00
MUSCOVITE, Connecticut. Curved xld. plates on Feldspar. 3½x2 ..... 1.50
TYROLITE, Libethen. Incrustation on rock. 3x2 ..... 2.00
WOLFRAMITE, Trumbull. Pseudo. after Scheelite xls. in rock. 2½x2½.. 2.50
PYRITE, Park City, Utah. Group of brilliant xls. 2½x2½ 3.00
CALEDONITE, Leadhills, Scotland. Minutely xld. w. Linarite. 2½x2½.... 5.00
VESUVIANITE, Monte Somma. Xld. on rock. 2½x1¾ 2.00
COBALTITE, Sweden. Small distinct xls. in Pyrrhotite, 2¼x1½ 2.50
ENSTATITE, Norway. Sharp 1½ inch xl. in small group. 1.50
SPINEL, Amity, N. Y. Good xld. group. 2x1¾ with 1⅛ xl. 3.00
FLUORITE, Cumberland Parti-colored lilac & yellow xls. 3x2 ..... 2.00
AXINITE, Nevada. Crude xls. in xlline. mass. 3x2 ..... 2.00
QUARTZ, Herkimer, N. Y. Mammoth 2¾ inch xl., slightly smoky 2.50
COVELLITE, Chile. Xlline. mass. 2x2x1¾ 2.00
CASSITERITE, Cornwall. Small xls. in mass. 2½x2¼x1½ 2.50
METEORITES: Siderite, Henbury, Australia. Complete. 187 grms. 5.00
Siderite, Magura, Hungary, Slab. 2x1½x¾. 216 grms. .. 17.50
Aerolite, Forest, Iowa. 18 grms. 3.00

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No lists furnished, but enquiries for specific minerals welcomed.

ROCKS and MINERALS
PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

JUNE 1947

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The official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

WHY WE DID NOT ATTEND CONVENTION!

In the February and March, 1947, issues of *Rocks and Minerals* we announced our plans for attending the Annual Convention of the California Federation of Mineralogical Societies which was to be held in Santa Barbara May 23, 24, and 25. The Santa Barbara Mineralogical Society was running the Show this year.

On March 29th, we sent the Santa Barbara Mineralogical Society a check as payment for space at the Convention as we wanted Rocks and Minerals Assocation to be represented and *Rocks and Minerals* to be featured. We expected to receive in due time an acknowledgemnt and a cordial invitation to come.

In the meantime a number of distressing letters arrived from collectors and dealers, all from California. The writers seemed to fear that the coming Convention was not being managed right so that the Show this year would be a poor one. Perhaps their fears were justified for as day followed day we received no acknowledgment of the receipt of our check, no publicity releases, nor any encouraging news about the coming event. By May 1st we gave up all hope of hearing from Convention headquarters and abandoned plans for the trip west.

On May 6th we did receive a letter and a most cordial one from Mr. Orlin J. Bell, President of the Federation, who, having heard from a mutual friend that we had been left stranded, wrote us extending many courtesies and offers of help, but it was too late.

We do not know if our application for space had been overlooked or mislaid. We have but two subscribers in Santa Barbara, one of whom moved there recently from Brazil, so it may be possible that we have no friends in the Santa Barbara Mineralogical Society and being little known our application for space was ignored entirely. We were going a long distance, from one coast to the other, and with the Association's huge membership, scattered all over the world, the Santa Barbara Mineralogical Society should have acknowledged our application and given us a word of encouragement about coming out. We were most anxious to attend and had all intentions of going out—we were planning to be away four weeks and on the way back attend the Convention of the Rocky Mountain Federation of Mineral Societies at Salt Lake City, Utah.

We are much disappointed in not being present at the Conventions and especially so, as many of our advertisers and friends cooperated heartily to help us get away. To these kind friends and to those in the West who offered to entertain us with trips to localities were we to stop at their homes our most grateful thanks are extended.

COLLECTORS' Directory

The following rockhounds would be pleased to have visiting collectors call on them:-

Frank Baalim, Madoc, Ont., Canada

If you wish visiting collectors to call on you, and you will give directions how to reach interesting localities in your area, we will place your name and address on this list. Drop a card to *Rocks and Minerals* requesting this listing.

On a rock hunt through Rocks and Minerals

Editor R&M:

I am very happy to renew my subscription to *Rocks and Minerals*. Even though winter or school work prevents my going on a rock hunt, every time my copy arrives I go on one through the pages of *Rocks and Minerals*. I wish to thank you for making it possible for me to receive this interesting publication.

May 8, 1947

Bernard L. Zettl
Rosedale, N. Y.

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

JUNE 1947

THE STURBRIDGE GRAPHITE MINE

BY PROF. CHARLES PALACHE
Cambridge, Mass.

If a traveller west bound on Route U.S.20 beyond Worcester, Massachusetts, notes the intersection of his road with Route 113, he will know that he is near the little town of Sturbridge. Located in a rather desolate part of the rough highland of central Massachusetts, the town is of no great importance but its name appears in many mineralogical works as the site of the Sturbridge Graphite Mine. Now an abandoned pit, this graphite deposit was certainly the scene of the first active mining in New England. The picturesque story of this long-lived mine has been reconstructed rather fully from old documents and is told at length in a book not likely to come to the notice of the mineralogical student. So it seemed worth while to retell the outlines of the story.

When the Pilgrims began to explore the country about the settlement in Massachusetts Bay they found well-trodden paths made by the Indians in various directions through the wilderness to the west. One of these was pointed for the Connecticut Valley and came to be known as the Bay Path. It followed a fairly direct course from Jamaica Pond through the Newtons and Wellesley, Natick, Hopkinton, Grafton, Millbury, Oxford. Charlton, and South Uxbridge to Sturbridge and beyond along the southern border of the state to Agawam or Springfield. . Along this path in 1633 went John Oldham with his pack horse, trading with the Indians, and on his return to Boston with hemp and beaver skins he brought back to Governor Winthrop "some black lead whereof the Indians told him there was a whole rock." The Governor's son, John Winthrop, Jr., was already engaged in mining ventures, making salt near Salem and smelting bog iron ore near Lynn. In 1644 he secured a grant from the General Court to land in the vicinty of the black lead deposit which was known to the Indians by the name Tantiusques. He had as a matter of fact already secured from the Indians in exchange for some uniforms, clothing and other goods "all the Black Lead Mines and Minerals with all the Lands in the Wilderness—for ten miles each way."

The family documents relating to this grant and many succeeding it were carefully collected and arranged in a book by Robert C. Winthrop of Boston who presented them about 1900 to the American Antiquarian Society of Worcester. In volume *14* of the Proceedings of that Society may be found a story "The Tale of Tantiusques" in which Mr. George H. Haynes, a native of Sturbridge, has collected the outstanding features from these documents of the Winthrop family. From this story I in turn have collected some of the high lights.

John Winthrop, Jr. seems never to have visited the mine but he lost no time after getting his grant in hiring a man to explore the ledge and dig the black lead for which he was to "have after the rate of fourty shillings for every tonne to be paid him when he digged up twenty Tonnes of good marchantable black lead and put it into a house safe from the Indians." He certainly had large ideas of the abundance of the ore but there is no record that anything came of this first attempt and it was not until 1658 that mining was really begun. . The miners found it a difficult matter to get out the black lead. The rock had to be broken by fire on the rock face, quenched with water and then worked out with gads and bars. The product was to be delivered at Win-

sor on the Connecticut River, transport being of necessity by pack horse. The record of production is a blank and it is not certain that any black lead then crossed the ocean to London, its only market.

John Winthrop, Jr., died in 1676 and for the next fifty years the Sturbridge property was tied up by law suits among the heirs and by questions asked by the General Court as to the extent and bounds of the vague grant. A survey was ordered in 1715 and was fought over and finally in 1728 the title to the property was confirmed to the Winthrop family but was now but four miles square. By this time the owner was another John Winthrop, grandson of the original proprietor. He was a restless spirit with decided tastes for literary and scientific studies. But he was a poor business man and had a high temper in poor control. After living for some time in New London, Connecticut, he found himself hated and deeply in debt on every hand and decided to seek a more congenial environment. He removed himself to London leaving his wife and children behind and there he remained till he died, twenty years later. He had been to the Black Lead Mine while the survey was being made and persuaded himself that his wild estate had untold mineral wealth. On an extant copy of the survey map he had entered at various points such notes as "Place of good Copper Oar"; "Iron Mine"; "Heavy Black Stone rich in Tinne and Silver"; "Small veins of pure Silver" and many others similar. As he had become a Fellow of the Royal Society soon after reaching London, his word on scientific matters was considered reliable. But he seems to have been absolutely unscrupulous and made use of false assays of his black lead which purported to show it rich in silver. He made contracts with two London merchants to work the mine on the basis of his misinformation and they put up large sums of money and one of them came of America to reopen the mine. After endless difficulties this man finally returned to London with about a ton and three quarters of black lead. . Even as black lead this proved to be of poor quality although Winthrop was highly excited about it and made still wilder claims as to its high silver value. His dupes sued him for their advances and the rest of the dreary tale of Tantiusques tells of these lawsuits against Winthrop till his death in 1747 and afterwards against his wife. Thus came to an end the early working of the mine which had produced little else than the disappointment of the fondest hopes.

In an appendix to his story Mr. Haynes gives a brief account of the later history of the mine. It lay idle until 1828 when Frederick Tudor of Boston purchased the "lead mine tract" for a small sum. Tudor later made a fortune in the ice business, including in his operations the fabulous but successful shipment of cargoes of ice from Wenham Lake to India under sail. He operated the mine more or less continuously till his death and it remained a part of his estate until 1889. The mine was developed as a long open cut over a distance of five hundred feet and to a depth of from 20 to 50 feet. He manufactured crucibles from it, a purpose for which it was well adapted. In a copy of J. D. Dana's Manual of Mineralogy, 5th Ed., 1853, I find it stated that this mine produced 30 tons of graphite annually; there is also a detailed description of the manufacture of lead pencils from it as carried on at Taunton, Mass. The mine was still working in the 1860's but caves of the overhanging wall of the open cut brought mining to an end. Mr. Haynes' last statement is to the effect that the mine and property were sold in 1893 to a Mr. Chapin of Southbridge and that a new company, the Massachusetts Graphite Company, was organized in 1902 to take it over and was about to reopen it as a mine.

Now I chance to possess a prospectus of this company which is a bald and outrageous stock-selling document. The vein is described as 4000 feet long and 6½ feet wide, already developed over 3000 feet to a depth of 75 feet. They expect to produce 26 tons of graphite of the highest quality a day at a cost of $780. so that net profits per day will be $3620 or for 300 working days, one million dol-

lars a year! There is a silvered picture of a lump of graphite from the mine "98 per cent pure, weighing 515 pounds, the largest lump of pure flake graphite in the world." All lies! and needless to say, the mine was never worked by this company.

Today it is a shallow pit filled with rubble.

Editor's Note: To reach the mine, start at the Connecticut-Massachusetts line (Conn.15) and go north into Massachusetts for 1.5 miles where a dirt road goes off to the left. (a historical sign "Tantiusques and the lead mine, etc." is here). Turn in on this dirt road, go 0.3 mile and turn right; go 0.8 mile further, keeping to your left all the way, until at 1.1 miles from Conn. 15 the dirt road goes over the graphite pit. Although the pit is much overgrown, the workingss on both side of the road are plainly visible.

BURIED TREASURE ON OKINAWA

BY JOHN D. ABBOTT

Franklin Mine, Mich.

It wasn't too bright a day when Dan McKenzie and myself went out to explore the southern end of Okinawa. We'd heard of Shuri castle about three miles northeast of Naha and wanted to have a look at it before we left the island. As it happened there wasn't much of a castle left there, but there were a few remains of what had been rather large frame structures nearby.

Through intermittent rain we explored one of them finding pieces of scientific equipment. We decided the building had been a laboratory or a museum of some type, for we found broken thermometers, test tubes, tuning forks, crucibles, and electrical instruments. I imagine this apparatus had been thrown down before by scores of G.I.'s who were exploring this area as we were. Everything we saw had been destroyed beyond repair, so we just eyed it with interest and looked further in the rubble wishing we could find some little souvenir of value. Our wishes came true when we uncovered buried treasures that others had overlooked. I suppose my keen rock-hound eye spotted clues which led to this mineralogist's Utopia, for buried under the debris was a fine little collection of various minerals in massive and crystalline form which was probably the pride of the Shuri Museum. (Whether it was a museum or not I never did find out, but evidences of stuffed birds and fishes led me to believe it was.) A perfectly formed quartz crystal caught my eye and this led me to pull aside some of the wooden frames and beams and search over the immediate area. A small piece of tourmaline was lying partially hidden beside the quartz crystal and with this discovery my enthusiasm increased. After I picked up several specimens in rapid succession I decided to comb the area carefully. Dan wasn't interested in minerals and so when I told him I would be ready in a couple of hours he amused himself with some mechanical gadgets he dug up.

All in all I picked up 52 specimens, some large and some small, ranging from a half inch to four inches in size. Cheap paper boxes were scattered about which probably held the minerals on a table for I found no evidence of broken glass which might have been a show case. Of great interest to me were the few labels I found written and numbered in Japanese and some of them also in English. These were rather battered from the weather but I saved them along with the minerals and consider them an important part of the collection.

While I was on Okinawa I also gathered stalactite and stalagmite specimens from the Futemma limestone cave mentioned in an article from the May, 1945, edition of *Rocks and Minerals*. However, my first acquisition at the Shuri Museum is of the greatest value to me and takes up a neat little corner in my ever growing mineral collection.

MORE ON UVAROVITE GARNETS

BY JOHN N. TRAINER

Outokumpu, Finland

In the writer's article on uvarovite garnets in the October, 1946, number of *Rocks and Minerals,* he referred to the statement by L. J. Spencer in his book "A Key to Precious Stones" that the largest crystals of this garnet come from Outokumpu, Finland. This led to further investigation.

Arani Laitikari, Director of the Geological Survey of Finland, sent the writer a single crystal from Outokumpu, a dodecahedron modified by the trapezohedron, five-sixteenths of an inch in size, and also specimens of the copper ore and adjacent rock enclosing uvarovite. Later Pentti Eskola, Director of the Geological Department of the University of Helsinki and author of "Chrome Minerals from Outokumpu," referred to here, sent the American Museum of Natural History a complete suite of the rocks and minerals from this locality showing many interesting and unusual features.

First as to the mine itself; Outokumpu is a copper mine in a geological environment typical of the ancient Karelian Mountain zone of Fennoscandia in eastern Finland. The copper ore is a sheet-like mass about a mile and a half long and about fifty-two feet thick overlain by serpentine intercalated by quartzite, dolomite and a graphite-bearing schist. The dolomite in turn is bordered by skarn rocks showing vivid green chrome minerals in many places intensified by uvarovite.

When uvarovite was first reported by Leon H. Bórgstróm (1901), a Swedish mineralogist, the locality was given as Syssma, a village in the parish of Kusjarvi. It was not given as Outokumpu until 1910 when copper was discovered in the hill of that name.

The Outokumpu specimens recently sent by Eskola to the American Museum of Natural History number fourteen and can be seen there by anyone who is interested. They are:

The ore (sulphides and quartz) with an exposed distorted dark green crystal of uvarovite measuring one inch on the long axis of a dodecahedron with inclusions of chromite. It is probably the largest crystal known. It could not be moved from the matrix without fracturing. A thin section of the ores shows clearly the uvarovite, sulphides and quartz.

A specimen of skarn, an adjacent rock consisting mainly of gray green chrome tremolite, with exposed broken bright green uvarovite crystals of which the largest is about a half inch in size.

Several pieces of quartzite with small but good uvarovite crystals on them.

A large specimen of an adjacent rock consisting of quartz, uvarovite, pyrrhotite and tawmawite (chrome epidote). A three-eighth inch crystal of uvarovite enclosing some chromite is in it. There is also a line of partly decomposed dark green and black tawmawite similar in many features to this rare mineral from Tawmaw, Burma. A vial containing small tawmawite crystals.

A showy bright green specimen of chrome diopside and chrome tremolite with calcite and small crystals of pyrrhotite.

Chrome diopside in quartzite with uvarovite enclosing chromite.

A specimen of dolomite with uvarovite in it.

A specimen of the ore which on the average is 12% chalcopyrite, 32% pyrite, 14% pyrrhotite, 2% sphalerite and 40% quartz but with no visible uvarovite in it.

A specimen of dull green fuchsite (chrome mica) on quartizite.

And specimens of cordierite, anthophyllite, cubanite (a copper and iron sulphide) massive pyrrhotite and quartz.

The suite as summarized above shows the prevalence of uvarovite, copper and chrome minerals and the associated min-

erals, some of which are unusual as far as uvarovite is concerned. Graphite is the only associated mineral not seen in the specimens.

Up to 1929 no chrome minerals could be seen in the copper ore mass but in that year several large uvarovite crystals up to seven-tenths of an inch in size were found in the ore in the central shaft. Presumably the one inch specimen mentioned above is from the same source. These are the largest crystals known; specimens are in the collection of the University of Helsinki. None have been brought out since.

In 1932, Eskola found and reported uvarovite in several blocks of quartzite on the dumps at the entrance to one of the shafts as a striking constituent with bronze brown pyrrhotite which traversed a fault. He considered this a sensational proof that chromium here is a true vein element and a constituent of hydrothermal solutions. M. A. Peacock in 1936 came to the same conclusion about the chromium in the Orange Mountains in New Mexico.

The indications are that the migration of the chromium with replacement reactions occurred simultaneously with the formation of the copper or a little earlier.

Bórgström analyzed the garnet and found the chromium oxide content to be 27.54% which is not as high as the theoretical content of 32.52% or the content of the Saranovskaya (Urals) specimens which is 38.94%.

The purest uvarovite at Outokumpu so far known came from a prospecting shaft southwest of the present shafts but the form and character of this occurrence can no longer be ascertained because no copper was found and the shaft has filled with water. Presumably the writer's five-sixteenths of an inch crystal is from this occurrence.

The crystals are generally described as the size of peas on the average which is not as large as those from the central shaft described above, or the writer's single crystal and those in the suite recently received by the American Museum of Natural History. Mr. Gunnar Bjareby of Boston, one of the few collectors in this country owning specimens from Outokumpu, says that the crystals in his specimen are from one-eighth to three-sixteenths of an inch. The crystals from other localities run from drusy coatings up to an eighth of an inch. All of which confirms Spencer's observation that the crystals from Outokumpu are the largest known.

The crystals are dodecahedrons modified by the trapezohedron like those from Eritrea and Val Malenco, Italy, which adds another interest to the occurrence. These are the only three localities where such a combination is found. Uvarovites from all other localities are described as dodecahedrons. Further study might reveal the explanation of this variation from the usual crystal habit.

Still another notable feature of the Outokumpu uvarovite is that it is not homogeneous. In one and the same crystal will be zones of different refractive power due probably to variations in the chromite content. It is idiomorphic where it meets the ore body. This anomalous birefringence in different zones in garnets is common but the Outokumpu uvarovites show an unusual variation of luster on the dodecahedral and trapezohedral faces, the former having a much greater brilliance. Some specimens have zones or cores of black chromite.

The unique features of Outokumpu, however, are that the uvarovite is *in* the ore and adjacent rocks and not *on* them as at other localities and that it was in the original magma. This is as sensational to one interested in the chrome garnet as the discovery by Eskola that chromium is a true vein element.

Crystals as large as one inch while they do not run over an eighth of an inch when deposited on chromite, etc. at other localities are very exceptional and may be explained by the slower crystallization from a magma.

Of all the uvarovite occurrences studied by the writer, Outokumpu is by far the most interesting.

Lucknow, Australia

The following is quoted from a letter recently received from the Australian Museum about the occurrence in New South Wales: "Uvarovite has been noted in four gold mines in the Lucknow dis-

trict. It occurred as bright green specks in decomposed siliceous-ferruginous material. Usually specimens were prepared by panning off the lighter material, the remaining uvarovite concentrates consisting of small dodecahedral crystals. These mines have not been worked for twenty years and therefore specimens would not be available." They were found at depths of 60, 130 and 200 feet and deeper and in situ in quartz adjoining gold-bearing joints. This is the only occurrence on record where gold is associated with uvarovite.

Orford, Quebec, Canada

In the American Journal of Science for September, 1946, there is an article entitled "Some Observations on Chromite" by Y. O. Fortier of the Geological Survey of Canada in which he describes an old nickel mine three-quarters of a mile west of Webster Lake in the eastern half of the Orford area in Quebec where the "Orford" uvarovite comes from.

A letter recently received from the Survey gives the exact locality as on the west side of Brompton Lake in Orford township, Range XI, Lot 6 in Sherbrooke County. Evidently it is between Webster and Brompton Lakes. The six localities mentioned by the writer in the October *Rocks and Minerals* are elsewhere in Quebec. Fortier says that the original millerite vein which was all mined out in 1878 was between a serpentine sill and quartzose schist. Calcite has replaced chromite in cracks in the serpentine. He found a good deal of diopside in elongated prisms up to six inches in length and in thick plates in the vein. The point of more immediate interest however is the action of the calcite on the chromite which was vigorously attacked and converted into uvarovite. When the crystals were broken open, cores of chromite were found in most of them.

Mr. L. N. Yedlin reports that some of the Orford uvarovites among his micromounts show phantoms.

The American Museum of Natural History has on display specimens from Orford with uvarovite crystals between elongated prisms of diopside which because of the contrast of the emerald green uvarovite with the light brown of the diopside are very attractive and more of which, according to Fortier, could be found today (figures 1 and 2)

Orford is the only locality where millerite is associated with uvarovite.

Uvarovite Localities

The writer has been frustrated in his attempt to list the uvarovite occurrences of the world with any degree of accuracy as intimated in a previous article and would not venture to publish them—at least not yet. There are eighty-six so far with some duplications but many omissions because of lack of exact localities which is the common experience of col-

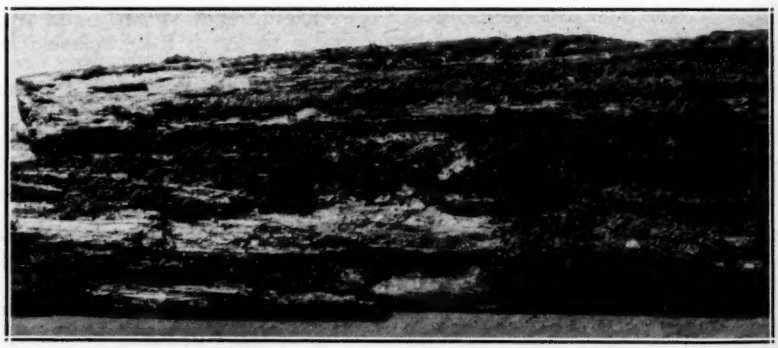


Figure 1. The dark gray encrustation is green uvarovite between and on elongated crystals of light brown diopside from Orford, Quebec. The actual size of the specimen which is in The American Museum of Natural History is 10 x 1½ inches.

Photography by Thane L. Bierwert

lectors. It is a large number. The average collector can off-hand think of three, Saranovskaya near Bissersk in the Urals, Orford in Quebec and Jacksonville in California where the best specimens come from. Outokumpu in Finland belongs in this exclusive group.

There are duplications such as New Idria and Idria in California, Bissersk and Saranovskaya and others. New Idria is correct for the first reported find in California and is the name of a mine whereas Idria is a town nearby and is often given as a district. Saranovskaya is the correct occurrence whereas Bissersk is a town eight miles distant. Place labels are often districts without exact localities. In the Idria district, for instance, are several uvarovite occurrences and if "Idria" is extended to include the headwaters of the San Benito River and the southern part of the county of the same name, there would be several more to add to the list.

There are four authenticated localities in Siskiyou County in northern California but Professor Frondel of Harvard, who recently explored that territory for minerals, says in a letter to the writer that he found uvarovite abundantly in chromite deposits with kaemmererite along fractures in massive chromite; some specimens very rich and showy but no crystals.

Of the eighty-six world occurrences, forty are in the United States and thirty-five of the forty are in California. One good reason why this state leads is because chromium minerals, especially chromite, which is so often associated with uvarovite, are found all up and down the Sierra Nevada and Coast Ranges. Another frequent associate is serpentine, of which there are large amounts in the same mountains. Dana lists chromite from over twenty counties in the state. Prospectors and collectors have "worked" California now for about a hundred years; and it is a large state. There are, therefore, many good reasons why there are so many uvarovite occurrences and there is no ending yet.

Another distinction for California is that it has produced the best specimens and largest crystals outside of Europe.

For assistance in preparing this paper the writer is indebted to Eugene Poitevin, Chief of the Mineralogical Section of the Geological Survey of Canada, to Dr. F. H. Pough of the American Museum of Natural History, Dr. S. J. Shand of Columbia University, to A. B. Walkom Director of the Australian Museum and to the following collectors: Gunnar Bjareby, Robert O. Buck, C. M. Corwin, C. A. Noren and L. N. Yedlin.

REFERENCES

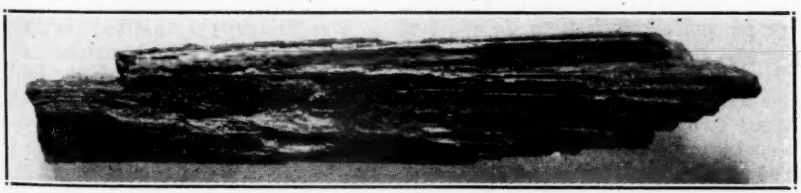
Bórgström, Leon H. (1901)
On Uvarovite from Kuusjarvi (now Outokumpu) Finland. Geol. Foren. i Stockholm. Forhandl 23. Note 3.

Smith, George (1926)
Mineral Resources No. 34. Geol. Survey of New South Wales. Page 70.

Eskola, Pentti (1935)
On chrome minerals from Outokumpu.
Bull. Geol. Com. of Finland.
Vol. 17, No. 3. Page 26.

Peacock, M. A. (1936)
Xenoliths in the Organ Batholith.
Amer. Min. Vol. 2. page 312.

Fortier, Y. O. (1946)
Some observations on chromite at Orford, Quebec. Am. Jnl. Sci.
Vol. 244. No. 9. Page 649.



A section of the specimen shown in Figure 1. **Photography by Thane L. Bierwert.**

A MINERALOGICAL JOURNEY ALONG THE EASTERN STATE PARKWAY, N. Y.

BY PETER ZODAC, EDITOR
Rocks and Minerals

Putnam County, in southeastern New York, is one of the smallest counties in the State but it has many interesting mineral localities one of which is the world-famous Tilly Foster iron mine near Brewster. In the eastern part of this county are a number of localities, many of which are but little known. Some of the localities are along the Eastern State Parkway (also known as the Taconic Parkway) which was opened only a few years ago. The parkway goes through a virgin section of the county with only a few houses seen along the route. Many fine rock exposures border both sides of the road and the scenery in parts is very nice.

We will begin our journey at the intersection of the Parkway with U.S. 6, near Shrub Oak in Westchester County. Our speedometer is set at 0.00.

0.1 mile. Gneiss outcrops to right of road. From here and to the very end of Putnam County the rock seen bordering both sides of the road is gneiss with here and there small pegmatite dikes or schist.

0.5 mile. Putnam County line.

5.6 miles. About 50 feet to the right are the remains of the Bradley limonite mine. When the parkway was put through, 13 years ago, (1934), the road went right through the mine—the dumps were covered up and the pit itself almost filled up. All that remains of the old pit is a small depression about 20 feet in diameter and about 5 feet deep. Five white birches are now growing around the very edge of the pit. A concrete wall has been built along the eastern edge of the pit and a culvert from the pit (for drainage purposes) goes under the road (a small grating along the right edge of the road marks the culvert). It is believed that this culvert parallels an old tunnel that may still be present many feet below. This mine was opened up over 100 years ago. The only mineral found by the writer was limonite (bog ore). No ore is now available as the pit has been graded and seeded.

5.9 miles. Parkway goes over the Peekskill Hollow Road near Tompkins Corners, to left. Road to right goes to Kent Cliffs. Peekskill Hollow, a narrow valley, runs N.E. and S.W. and is underlain by Poughquogue quartzite although the rock is nowhere visible near the parkway. Some was seen in the limonite pit before it was filled up.

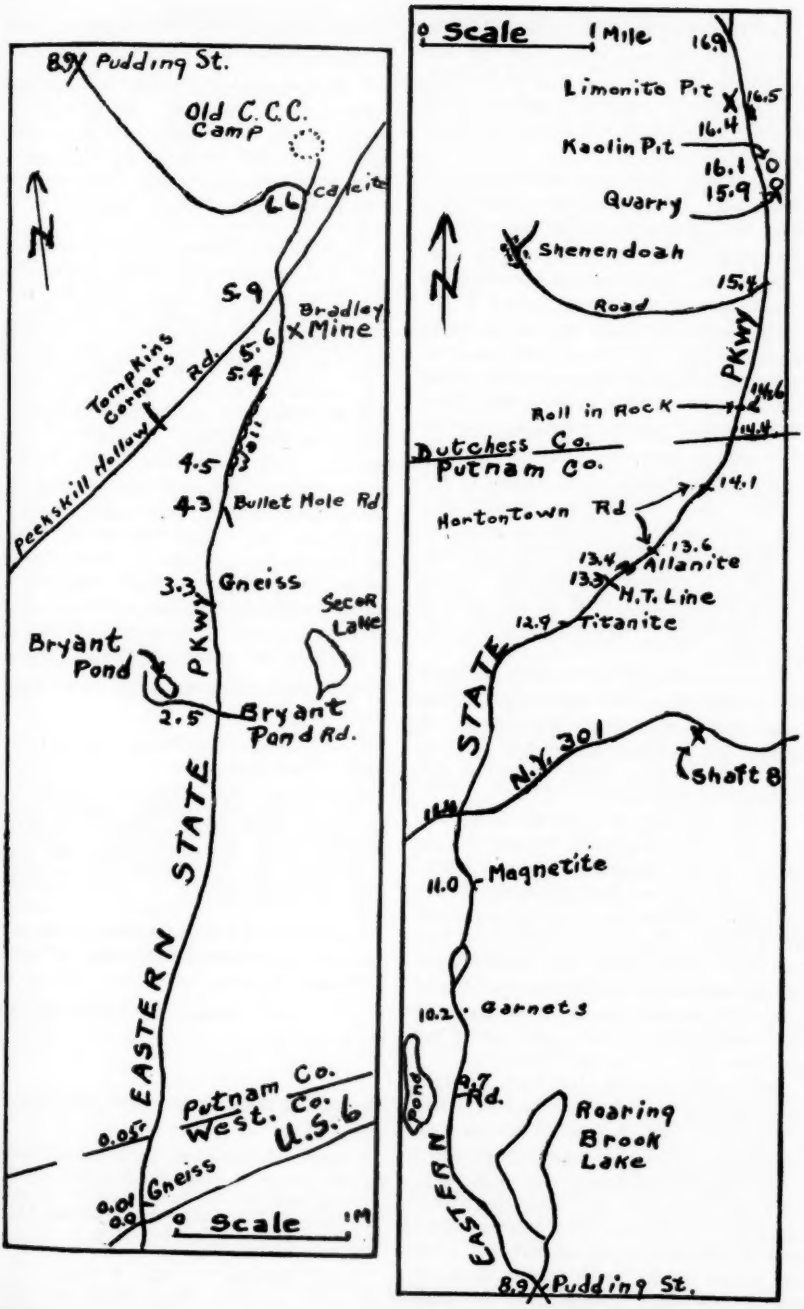
6.6 miles. Small pegmatite vein in gneiss on right. The most interesting mineral seen here was calcite as white platy crystals encrusting pegmatite (found by Mr. O. W. Bodelsen). Allanite and biotite were also seen. About 100 feet further, dirt road to abandoned CCC Camp.

10.2 miles. A long outcrop, about 200 feet in length and 15 feet high is on right and consists of gneiss, garnet gneiss, garnet schist, and schist. Minerals seen were biotite (black flakes), garnet (almandite), and opal (hyalite).

11.0 miles. Pegmatite outcrops both sides of road. Lots of magnetite in it (small black masses).

11.4 miles. N.Y.Rt.301 (7-mile Road) crosses parkway, via bridge. About 1.5 mile to right on Rt.301, Aqueduct Shaft No. 8 (now abandoned) is 300 feet to right. The shaft is abandoned but near the road (301) are the remains of a dump where the following minerals may yet be found: actinolite, allanite, biotite, calcite, epidote, garnet, graphite, hornblende, magnetite, microcline, molybdenite, pyrite quartz (bluish) serpentine, talc, titanite, tourmaline (black).

The bridge (11.4 miles) is in the Clarence Fahnstock Memorial Park. About 0.3 mile to the left of the bridge, on Rt.301, the Canada Magnetite Mine begins. This old abandoned mine consists of narrow pits about 50 feet to left of the road and parallel it for over ½ mile. Some of the pits have been filled in—the parking lot is one of them.


8.9 Pudding St.
Old C.C.C. Camp
Calcite
5.9
Bradley Mine
5.6
5.4
Tompkins Corners Rd.
Peekskill Hollow
4.5
4.3 Bullet Hole Rd
3.3 Gneiss
Secor Lake
Bryant Pond
Pkwy
2.5
Bryant Pond Rd.
EASTERN STATE
0.05
Putnam Co.
West. Co.
U.S. 6
0.01
Gneiss
Scale 1M
Scale 1 Mile
16.9
Limonite Pit
16.5
16.4
Kaolin Pit
16.1
Quarry
15.9
Shenendoah
15.4
Road
Pkwy
Roll in Rock
14.6
14.4
Dutchess Co.
Putnam Co.
Hortontown Rd
14.1
13.6
13.4 Allanite
13.3 H.T. Line
12.9 Titanite
STATE
N.Y. 301
Shaft 8
11.4
11.0 Magnetite
10.2 Garnets
Pond
9.7 Rd.
Roaring Brook Lake
EASTERN
8.9 Pudding St.

About 1000 feet past the parking lot and at the end of a "little" cliff on left (about 25 feet high) is a most interesting exposure of magnetite gneiss. Some of the magnetite at the mine is a weak lodestone.

12.9 miles. Titanite occurrence, left of road. See "Two remarkable occurrences along the Eastern State Parkway, N. Y." which appears in this issue.

13.3 miles. High tension line overhead crosses parkway.

13.4 miles. Allanite locality at large pegmatite dike. See "Two remarkable occurrences along the Eastern State Parkway, N. Y." which appears in this issue.

14.4 miles. Dutchess County line. A small sign is here.

14.6 miles. Crystalline limestone in roll in rock along left side of road. Tiny dark green diopside crystals occur in the limestone. Small black tourmaline crystals are also present in a pegmatite dike.

15.4 miles. Dirt road to left goes to tiny hamlet of Shenendoah, about 1½ miles away.

15.9 miles. Pegmatite outcrop on right. The pegmatite is 150 feet long, 10 feet high, and is somewhat decomposed. A number of fairly nice epidote and titanite crystals have been found in this decomposed pegmatite.

About 275 feet to right of road (200 feet up a 30° slope and 75 feet on the level) is an abandoned quarry whose rock is gray gneiss. Rock from the quarry was used, apparently, to construct walls and bridges of parkway. Quarry is 100 feet in diameter and 25 feet high. Nothing of mineralogical interest was found here. The quarry can be seen from the road only during winter, when there are no leaves on the trees in front of it.

16.1 miles. About 300 feet to right (200 feet up a 30° slope and 100 feet level) is the old abandoned Shenendoah kaolin mine. Ruins of an old hoist and a 3-foot mill wheel near it are to be seen. Two pits are here. The main one is approximately 100 feet in diameter (dry) and 25 feet deep.; the smaller one (100 feet to the north) is 15 feet in diameter and 6 feet deep (dry). No minerals were to be seen. The pits cannot be seen from the road.

16.4 miles. Quartzite (Poughquogue) outcrop on right. It is massive, gray, blocky with beds of gray slaty schist. It is 100 feet long, 10 feet high—at its northern end is the beginning of a retaining wall 250 feet long.

16.5 miles. Along the left edge of road is a wall 200 feet long. About 200 feet down on a 60° slope, from the center of the wall, is the old abandoned Shenendoah limonite mine. Mine pit is 100 x 50 feet in area and is full of water. (A nearby native said the pit was 600 feet deep but this depth must be greatly exaggerated). The terrain is very swampy and overgrown with brush. Some compact cellular masses of limonite (iron ore) which were light to dark brown in color were found on the overgrown dumps. Many of these masses when broken open yielded soft yellow earthy limonite (yellow ocher). The mine pit, which can be seen from the road, looks like a swamp hole.

16.9 miles. Beginning of split highway.

17.0 miles. Sand bank 200 feet to right. Not examined .

17.3 miles. Dark gray limestone, 25 feet long, borders both sides of the road. From here on, for many miles, the rock is all dark gray limestone with at times veins of white calcite.

17.5 miles. Sand bank about 1,000 feet to right. Examined but nothing of interest found in it.

18.7 miles. Intersection with N. Y. Route 52.

Rocks and Minerals competes with Army

Editor R&M:

I have again joined the ranks of our Army but my interest in *Rocks and Minerals* has not been lessened by it. Please continue to send the magazine for which I am enclosing $3.00 to cover another year's subscription.

April 2, 1947

S/Sgt. Z. Hajny
Scott Field, Ill.

GEIGER-MUELLER COUNTER TUBES

One of the most useful detecting elements for detecting and measuring the penetrating rays of radium, and measuring intensity of cosmic rays, is the familiar Geiger-Mueller Counter Tube. When provided with the proper operating voltage and proper circuit, this tube will give a series of electrical impulses having a frequency proportionate to the intensity of the rays striking the tube.

The Geophysical Instrument Company offers a newly developed improved Geiger-Mueller Counter Tube of an all-metal type.

Many advantages are attained by this new construction, among them the following:

1. Mechanical robustness.

The familiar type of glass tube, or the metal tube with large glass ends, are both vulnerable to breakage unless unusual care is taken in handling. The Geophysical Instrument Company all-metal tube is well adapted for use in the many industrial and research applications where the fragility of a glass tube would prohibit its use.

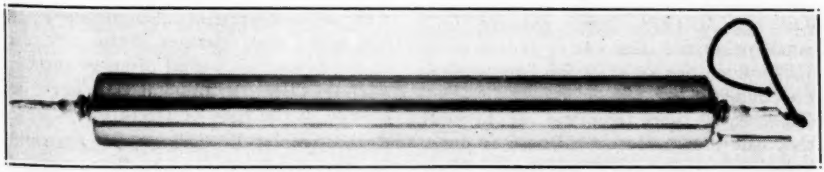
2. The active diameter of the G. M. counter is very nearly equal to the overall outside diameter; consequently these tubes are particularly adapted for use in cosmic ray telescopes and other coincidence circuit arrangements. They also find valuable usage in gamma ray apparatus where space for the tube is at a premium. The active volume of the tube is a maximum for its size. In other words, a tube of greater sensitivity may be fitted into the same space.

3. The intrinsic background count of the tube is lower. As is well recognized, even in the absence of radiation, a Geiger-Mueller tube will give some impulses. These are due to the unavoidable intrinsic radio-activity of the material making up the tube itself, together with spurious effects due to accumulated charges on the interior, etc. These effects appear to be more serious with the conventional type of glass tube. Actual experiments show that a lower "background" may be obtained by the use of the all-metal type of tube, believed to be due in part to the elimination of the spurious charges which accumulate and discharge in irregular fashion on the interior of the conventional glass tube.

A wide variety of sizes is offered ranging from ½" diameter and ½" long to 3" diameter and 5 feet long.

The operating voltage for the metal tubes is is in the vicinty of 1000 volts. The cosmic ray efficiency is better than 99%. The plateau (range of operating voltage) is 100 volts or more and the change in counting rate over this plateau is guaranteed to be kept within .05% per volt. (in many cases this has been kept within .01% per volt.) Tubes are furnished separately for those constructing their own apparatus or are supplied complete with auxiliary systems, ready for measurement of gamma and cosmic ray intensities. Special tubes with thin windows are available for measurement of less highly penetrating rays.

These tubes are manufactured by Geophysical Instrument Company, Arlington, Virginia.



GEIGER—MUELLER COUNTER TUBE
(All Metal)

TWO REMARKABLE OCCURRENCES ALONG THE EASTERN STATE PARKWAY, N. Y.

BY PETER ZODAC, EDITOR

Rocks and Minerals

The Eastern State Parkway (also known as the Taconic Parkway) stretches through Putnam Country in southeastern New York from the Westchester County line on the south to Dutchess County on the north for a distance of 13.9 miles and averages about 8 miles east of the Hudson River. Its most noted attraction is the Clarence Fahnstock Memorial Park. The parkway has been built within the past few years and is a continuation of the Bronx Parkway; it final termination is supposed to be Albany but its present termination is approximately due east of Poughkeepsie, in Dutchess County.

TITANITE LOCALITY

At a distance of 1.5 miles north of the 7-Mile Road (N.Y.State Hwy. 301—under which the parkway passes) is an exposure of gneiss bordering both sides of the parkway. This is first locality and it is especially noted for its titanite. The following minerals occur here and are most prominent on the west side.

Albite: grayish striated masses as a constituent of the gneiss.

Fluorite: small greenish-white masses in gneiss.

Leucoxene: present as a creamy-white alteration product surrounding crystals of titanite.

Limonite: brownish stains on rock.

Magnetite: noted as small black masses and grains with augite and titanite crystals in- the rock on the east side of the road.

Pyroxene (Augite): dark greenish cleavable masses with titanite.

Quartz (Milky): occurs massive in a small pegmatite dike.

Riebeckite: occurs as bluish incrustations on pegmatite.

Titanite: is very common as lustrous, chocolate-brown cleavable masses in gneiss associated with albite and augite. Some of the masses when first found reached one foot in length and 6 inches in width. It is also present as small, wedge-shaped crystals of the same chocolate-brown color and of good quality. Crystalline masses of titanite have also been found. Only small masses of titanite are now present—the larger masses must have slabbed off due to frost action and removed by parkway patrol crews. However, there is lot of it present and it can easily be spotted by its color. Some loose masses have also been found on top of the bank. Titanite is the only chocolate-brown mineral thus far seen on the parkway.

ALLANITE LOCALITY

Just 0.5 of a mile north of the titanite locality is a large exposure of pegmatite that is 75 feet long and 40 feet high, bordering the west edge of the road. The following minerals have been found here:

Albite: White masses in pegmatite.

Allanite: Very common as slender black prismatic crystals in flesh-colored pegmatite. The allanite is so plentiful that the dike can well be called an allanite pegmatite.

The allanite is deep black in color with a dull luster. Practically every crystal noted was surrounded by a thin zone of brownish stained feldspar which immediately identifies the allanite. Furthermore a good part of the bordering feldspar appears to radiate from the allanite as if the allanite had drawn the feldspar towards itself. The allanite varies in length from tiny crystals up to those one inch long. Associated with some of the allanite but not penetrating nor even in contact with it, as far as could be seen, were titanite crystals, also magnetite. It was noted that fractures in the rock, due to our pounding, would often go through allanite as if the mineral had been deposited in the zone of fracture.

Arsenopyrite: Bordering the pegmatite on the north was a small outcrop of schist, stained brown by limonite. In small vugs and cavities of the schist were

tiny arsenopyrite crystals and masses but poor in quality.

Epidote: Small greenish masses in pegmatite.

Leucoxene: Common as cream-colored alteration crystals of, and as zones surrounding, titanite crystals.

Limonite: Common as brownish stains and small brownish earthy masses in the rocks.

Magnetite: Noted as small lustrous black grains associated with allanite.

Melanterite: Common as white efflorescences surrounding vugs containing arsenopyrite.

Microcline: Is the main feldspar of the pegmatite and is flesh-colored.

Opal (Hyalite): Noted as small white botryoidal crusts on exposed surfaces of the pegmatite dike.

Pyrite: Small masses and small but good cubes seen in the pegmatite.

Pyroxene (Augite): Dark green crystals occur in the pegmatite.

Quartz (Rock Crystal): One high vertical face of the pegmatite dike, facing to the south, was entirely encrusted with small rock crystals which were, however, of poor quality.

Quartz (Smoky): Small masses as a constituent of the pegmatite.

Titanite: Fairly common as small, chocolate-brown wedge-shaped crystals in the pegmatite associated with allanite. It was seen also in the bordering schist almost in contact with the arsenopyrite. Much of the titanite has been altered to leucoxene.

Zircon: Tiny dark brown crystal, with a small allanite mass, in pegmatite, was found April 14, 1940, by Mr. Lester W. F. Peper, of Spring Valley, N. Y., who presented it to the writer three years later. When the locality was again visited by the writer, on March 31, 1944, with Mr. O. W. Bodelsen, President of the R.&.M.A., a number of tiny zircon crystals were found, because we looked for them. The crystals were always noted close to but never touching the allanite.

The place to collect specimens is not at the dike itself but directly across from it where many loose pieces of the rock have been dumped. It was here where all the zircons were found. A small exposure of the dike is also present at this spot (along the east side of the road).

The parkway is patrolled by Parkway police and at times there may be some difficulty in obtaining spacimens, due to the heavy traffic. But at the spot where the loose pegmatite has been dumped there is a short stretch of dirt road where a collector can park his car and be off the parkway and can collect minerals without being stopped by police.

One mile north of the dike is the Dutchess County line which is marked by a sign. Coming south from the Dutchess County line, the pegmatite dike is the first rock exposure on the right (west side).

(Note—See "A mineralogical journey along the Eastern State Parkway, N. Y." which appears in this issue.)

DAUPHINY, FRANCE

Dauphiny or Dauphine is an ancient province of Southeastern France now divided into the following three departments of Drome (chief town, Valence), Hautes-Alpes (chief town, Gap), and Isere (chief town, Grenoble). After it had long been governed by counts called Dauphins, it was ceded to the crown of France in 1349. It was bounded on the west by the Rhone River.

The above three departments now comprise the middle part of the French Alps which includes the high peaks of Ecrins, 13,452 ft. and Meije, 13,065 ft. The scenery is full of grandeur, though rather desolate in the upper valleys.

Among the famous mineral localities of the region, which in some manner are recorded as being in Dauphiny, are the old silver nickel-cobalt mines of Chalcanches (near Allemont) in Isere (about 12 miles east of Grenhoble) and Bourg d' Oisans, also in Isere, (about 15 miles southeast of Gren oble.

Bourg d' Oisans is especially noted for its magnificent rock crystals.

VACATION HINTS!

Summer is that season of the year noted chiefly for trips and vacations. This year, before leaving on your vacation trip, make a list of the dealers located along the route you intend to travel asd call on them. A trip to a dealer's establishment will always bring back pleasant memories of hours well spent. A dealer knows minerals and mineral localities and he has a large following among the collectors of the country. Therefore call on all the dealers you can and you can get their names and addresses from the pages of *Rocks and Minerals!*

HESS DISCOVERS NEW SUBMARINE VOLCANOES

BY CHARLES A. BELZ, SECRETARY
Philadelphia Mineralogical Society

With the first venturings of sea-faring men beyond the safety of their own shores, the great oceans with their raging storms, their enormous violences, their bottomless depths all exerted a hypnotic influence on the morbid imaginations of men. The garruious voyager spun tales of horror, and of monsters of the deep, to be told and retold at many a hearth to chill the bones of many a fearsome youngster. As was ever the case, when natural phenomena exceeded the comprehension, ignorance glibly accounted for anything unknown as being supernatural. But now and then a doubting Thomas with more curiosity than Faith hazarded an apprehensive peek behind the curtain, and presently a ghost is laid, a dragon slain, a flat world rounded, a fathomless ocean convincingly fathomed. And their sons, and grandsons' sons with matching curiosity, keep wondering about the mysteries of the great unexplorable Oceanic Deeps, and now with chain, now with wire, now with tenuous fingers of sound, keep scanning the rugged configuration of fabled Davy Jones's Locker. Charts and graph, and sheets of data, in prosaic ritual, prosaically exercise the devils of the deep. And Science today not only will accurately describe the contours of the Ocean floor, but will also plausibly explain the reasons for this awesome architecture.

The Philadelpia Mineralogical Society was honored at its March meeting in having Dr. Harry H. Hess, of the Department of Geology, Princeton University, describe his "Wartime Exploration of the Floor of the Western Pacific." As a member of the armed forces actively engaged in altering the visible land surface of the Western Pacific, Dr. Hess devoted some time in study of the effects of infinitely greater forces on the ocean bottom. As a result of many days of work with a Navy fathometer, he was able to map new areas, as well as correct the work of previous investigators operating with less accurate instruments.

Dr. Hess showed many slides of the varied submarine topography of the Western Pacific, particularly the area between the Asiatic Mainland, the Japanese Archipelago, and the Philippine Islands, including the belt of drowned volcanoes north of the Marianas, Caroline, and Marshall Islands. There are in the neighborhood of 160 of these submerged peaks in this area. Typically, they are approximately 15,000 feet high, about 10 miles across the top, and 20 miles across at the base, and are roughly circular in plan. Their tops are from 3000 to 6000 feet below sea-level. As a result of careful measurements of their sizes, depths, and profiles, Dr. Hess began seriously to question the adequacy of the "drowned atoll" theory. Fathometer readings show them to be flat across the top; the outermost margin may be described as a shelf with a gentle slope *downward* to the mountain side which drops precipitously to the ocean floor. This downward sloping shelf, and the absence of coral formation contradicts the "drowned atoll" theory, and Dr. Hess advances the following hypothesis to explain this peculiarity. They are undoubtedly extinct volcanoes, and must be older than the atolls since they pre-date the advent of lime secreting marine organisms. The original peaks, projecting above the sea, were truncated by the action of the seas, storms, and normal weathering, and their subsequent subsidence may be explained by isostasy. The progressive erosion of the continental land masses, and their consequent lightening, and the simultaneous deposition of this eroded material in the marine areas created an unbalanced crustal loading, which, according to the principles of isostasy, resulted in a sinking of the heavier ocean area, and an elevation of their lighter land area until a condition of equilibrium was restored. This transfer of huge volumes of land material to the sea bottoms displaced an equal volume of water, (upward, of course) so that while the ori-

ginal ocean floor was sinking, the water level was rising, and the relation of sea-level to continental land masses remained approximately constant. The sinking truncated oceanic volcanoes were drowned by the rising oceanic waters. By the time of the Lower Paleozoic Era they were engulfed well beyond the limits of coral growth.

There were numerous slides showing the submarine area between the Philippines, Formosa, and Japan as a flat-bottomed basin, bordered by sweeping arcs of mountain ranges with valleys of great depth. These, Dr. Hess explained, were formed by horizontal crystal movements buckling the ocean floor downward. So accurately have these contours been plotted that they can be used at times for navigational purposes. It has also been determined that the deep-seated earthquake epicenters are concentrated along these arcs of pronounced crustal folding. They occur uniformly where the under surface of these crustal folds probably produce opposing currents of the deep-seated viscous rock flows. The resulting tremendous stresses and strains caused by this conflict, and the necessary adjustments to these forces result in disturbances that are propagated through the rock core, and are recorded on seismographs round the world.

Commenting on the accurate results of the modern directional sonic fathometers, Dr. Hess mentioned that the Emden Deep survey had shown a greatest depth of 5740 fathoms, contrasted with previous recordings of 5900 fathoms. This discrepancy is undoubtedly due to the inaccuracies of previous non-directional instruments in which a reflection from the sloping sides may easily produce an error of as much as 10 per cent. Samples of soil taken from the floor of the Emden Deep as well as from other oceanic depths, reveal nothing but red clay. Dr. Hess explained that this is probably due to the fact that below 2500 fathoms, all calcareous minerals are dissolved, and that only insoluble minerals, volcanic ash, and some secondary minerals remain. Far at sea, the only foreign materials to be found on the ocean floor are necessarily air-borne. The exact composition and chemistry of the deep sea bottoms is still largely speculative owing to the obvious difficulty of adequate sampling.

TRIPLITE FROM EL PASO COUNTY, COLORADO

BY ARTHUR J. BOUCOT

Cambridge, Mass.

An occurrence of massive triplite, a fluo-phosphate of iron and manganese, previously undescribed, was observed by the writer during July of last year, near the southern end of Deadmans Canyon, El Paso County, Colorado. The locality is an abandoned quarry in a northerly trending near vertical pegmatite dike about fifty feet in thickness, which cuts a porphyritic red rhyolite body, which in turn is intrusive into the Pre-Cambrian country rock of the area.

The triplite and coarsely intergrown brown apatite occur as a single euhedral mass approximately two feet in diameter. The other minerals of the dike are a white potash feldspar, occuring in crystals up to one foot in diameter, and milky quartz together with smaller amounts of muscovite. The muscovite occurs in platy aggregates, radiating from a common center and averaging six inches in diameter.

The specific gravity of the triplite is 3.74. The material exhibits two fairly well developed cleavages, which are at right angles to each other. The mineral possesses a resinous to adamantine luster which easily distinguishes it from the dull brown of the intimately associated apatite, as well as the presence of iron and manganese.

WORLD NEWS ON MINERAL OCCURRENCES

(Bureau of Mines **Mineral Trade Notes**, March 20, 1947)

I. METALS

ANTIMONY

Honduras.—During the last quarter of 1946, a sample shipment of 15 long tons of antimony ore was made by Eleazar Vargas from a claim near La Union in the Department of Olancho. The ore is said to have assayed 64.95 percent antimony. No definite plans for developing the claim have been made, owing to lack of capital and the isolated location of the deposit.
(Vice Consul Albert K. Ludy, Jr., Tegucigalpa.)

GOLD

Saudi Arabia.—The Saudi Arabian Mining Syndicate reports that during 1946, 27,139 shorts tons of ore assying 1.88 ounces of gold per ton was treated; the recovery being estimated at 97 percent.

GOLD AND SILVER

Fiji.—During 1946, the Emperor Gold Mining Co., Ltd., and Loloma Gold Mines (N. L.), Ltd., in the Vatukoula area exported 68,859 fine ounces of gold and silver bullion. Virtually all bullion was exported to the United States. Neglible quantities of gold and silver were exported to Australia. (Consul Winfield H. Scott, Suva.)

Emperor Gold Mining Co., Ltd., milled 149,155 long tons of ore and recovered 48,795 ounces of gold and 12,845 ounces of silver during the fiscal year ended June 30, 1946. Ore reserves were estimated at 900,000 tons of positive ore containing 7.8 dwt. gold per ton and 120,000 tons of probable ore.

During the fiscal year ended June 30, 1946, Loloma (Fiji) Gold Mines N. L. treated 12,410 tons of ore yielding 23,045 ounces of gold and 7,625 ounces of silver. Ore reserves consisted of 70,000 tons of positive ore averaging 24 dwt. gold per ton, and 25,000 tons of probable ore averaging 12 dwt. gold per ton.

IRON

Morocco, Spanish.—Minas del Rif and Sociedad Anonima Minera Setolazar mines have been merged recently in an effort to cut overhead expenses. Both companies are experiencing difficulty in obtaining enough coal to produce electric power. Another impediment to full production is the shortage of native labor. (Vice Consul Albert U. Sherer, Jr., Tangier.)

LEAD

Morocco, Spanish.—Lead ore exported from Melilla to Spain during 1946 totaled 300 metric tons, 270 of which was from Minas de Afra and 30 from the Mauritania mine. (Vice Consul Albert U. Sherer, Jr., Tangier.)

MANGANESE

Australia.—Three grades of manganese are produced in Australia—manganiferous iron ore, metallurgical maganese ore, and ore suitable for dry batteries and miscellaneous uses—states C. L. Knight in Summary Report No. 7 on Manganese issued by the Department of Supply and Shipping, Commonwealth of Australia.

Manganiferous iron ore is mined by open-cut methods from the Iron Monarch deposits in the Middleback Ranges, South Australia. Metallurgical ore and battery ore is mined in Papua, Queensland, New South Wales and South Australia. Mining is by open cut or shallow underground operations. Operations in Papua consist in gouging out high-grade ore pockets.

Known deposits of manganese in Australia are described in the following paragraphs.

Queensland.—Total production in Queensland up to the end of 1944 was 23,891 tons, which 17,782 tons were from the Gladstone district, 4,956 from the Mary Valley district, 579 from the Cairns district, 401 from the Stanthorpe district, and 173 from the Rockhampton, Chillagoe, and Mount Peter districts.

Gladstone district.—Active mining in the Gladstone district ceased in 1920, although some ore was sold in 1927. Most of the ore was produced before 1912 and used by the Mount Morgan Gold Mining Co. in extracting gold. The most important deposit in the district is at Mount Miller, 5 miles west of Glad-

stone, from which 15,263 tons of ore, 64 percent of the State's total output, was mined. The second largest deposit was at Auckland Hill, from which 1,300 tons were produced. Comprehensive sampling of openings at the Mount Miller deposit in 1914 proved the existence of 35,000 tons of ore, but the silica content is too high for metallurgical use. Ore from the mine has been tested by a battery-manufacturing company but were found unsuitable for battery use.

Mary Valley.—Sporadic occurrences of manganese ore have been found over a wide area in the Mary Valley south of Gympie. Among the more important occurrences are those of Eel and Pie Creeks in the north, in the Amamoor Highlands, on Yabba Creek, on the lowlands near Mount Walli, and at Mount Allen. The ores are similar, consisting chiefly of dense psilomelane with varying amounts of pyrolusite. Total output from the district has been 4,956 tons, most of which was metallurgical ore assaying 50 to 54 percent manganese. Battery ore was produced from Mount Allen, and some of the early production from Amamoor went to Mount Morgan Mining Co. Most of the known lenses have been worked to economic limits. Other lenses of similar grade may be discovered by further prospecting.

Mount Martin.— Manganese occurs in many small deposits in the Cairns district. The Mount Martin deposits, 7 miles southwest of Cairns, have been the only ones worked in the district. Most of the ore mined consisted of a mixture of quartz and country rock with psilomelane and pyrolusite, which was hand-picked to produce marketable ore. In 1940 and 1941, 618 tons of ore containing 40 to 45 percent manganese was sold. The mine did not operate during 1942 and 1943 in spite of a shortage of battery ore. An attempt to concentrate waste material from the dumps proved unsuccessful in 1942.

Stanthorpe district.— Production of manganese has been from several small lenses 10 to 20 miles east of Inglewood. Output in 1941 and 1942 was 150 tons of metallurgical ore averaging 47 percent manganese and 14 percent silica.

New South Wales.—Total production of manganese ore in New South Wales up to the end of 1944 was 43,806 tons, of which 32,551, or 74 percent, came from the Grenfell mine. Production from other sources was small until the outbreak of war. During the war a number of deposits in the Tamworth district were exploited in an attempt to produce battery-grade ore. From 1940 to 1944, 4,624 tons of ore was produced, of which about 2,000 tons were battery grade.

The numerous ore bodies exploited in New South Wales have been virtually of the same type. The ore consisted largely of psilomelane and pyrolusite. Rhodonite was commosly associated with the ore occurrences.

Most of the past and present producing centers are in the Grenfell-Cootamundra zone; the Barraba-Tamworth zone; and Rockley-Rylstone area.

Production from the *Grenfell-Cootamundra* zone to the end of 1944 was 33,451 tons. Numerous occurrences of manganiferous ore are found along a north-south line about 125 miles long extending from Parkes to Gundagai, and mining has been carried on at Grenfell, Parkes, and Cootamundra. The only important ore body is 2.5 miles west of Grenfell. Two other lenses in the Grenfell district have produced a small quantity of manganese ore.

Barraba-Tamworth zone produced 4,634 tons of ore up to end of 1944. Between 1940 and 1944, 4,188 tons were produced, of which about 2,000 were battery grade. Production came from 15 to 20 separate lenses in an area 180 miles long and 60 miles wide. Chief producers were: (a) Hungerford and Spencer's mine, 15 miles northeast of Barraba, with a total of 1,057 tons to the end of 1944. Ore consists chiefly of solid pyrolusite, and some hand sorting was required to maintain a battery grade. (b) Fogarty's mine, 12 miles northeast of Manilla, produced about 700 tons of metallurgical ore. (c) At the Mount Sally mine, 6 miles west of Danglemah, several very short lenses were open-cut to shal-

low depths, and a vein 3-½ feet wide by 20 feet long was mined for a total production of about 600 tons of battery-grade ore. (d) Four deposits near Hall's Creek and Watson's Creek have been mined, apparently exhausting high-grade ore, for a total output of 950 tons. Most of the ore was battery grade. (e) Several ore bodies have been worked in the W a l c h a-Danglemah-Weabonga district for both metallurgical and battery ore. (f) A lens 10 miles east of Uralla is reported to have produced 1,000 tons of ore between 1918 and 1919.

Proved reserves in the district are very small. Many of the lenses have been worked to economic limits, and at present the Hungerford and Spencer's mine is the only one producing, with an output of approximately 235 tons to the end of June 1945.

Rockley-Rylstone area has produced about 2,650 tons of ore from ore bodies near Rockley and 1,118 tons from deposits near Rylstone.

The only important discovery outside of these areas is one at Deepwater, 446 miles by rail northwest of Sydney, from which 548 tons of ore has been produced.

The Broken Hill lead-zinc-silver mines produce a zinc concentrate from which manganese mud is obtained as a by product.

Victoria.—A total of 422 tons of manganese ore was produced in Victoria before 1928, virtually all of which came from Heathcote, 73 miles by rail north of Melbourne. There has been no production since then.

Tasmania.—Samples from a small superficial deposit in the Dial Range, 5 miles south-southwest of Penguin, assayed 14 to 26 percent manganese and 17 to 32 percent iron. Production amounted to only 0.6 ton in 1941. Manganese mud is obtained as a byproduct from the treatment of zinc conectrates produced at the Read-Rosebery mine.

South Australia.—From 1927 to May 1945, 5,361,495 tons of manganiferous iron ore was produced from the Iron Monarch deposit, 32 miles by rail northwest of Whyalla. The ore contains up to 30 percent manganese, the average of the ore mined being 8 percent.

Total output of manganse ore up to the end of 1944 was 57,922 tons. The three main producing centers were Pernatty Lagoon, which produced 32,295 tons; Carrieton district, 18,440 tons; and Blinman, 5,251 tons.

The main group of workings at *Pernatty Lagoon* is 5 miles northeast of Woocalla. Other workings are scattered over a considerable area to the north. Mining is by open-cut methods from two main groups of workings about 2-½ miles apart. Ore in sight was largely depleted by the end of 1943. An attempt made to beneficiate the ore to battery grade by ordinary ore-dressing processes provel unsuccessful.

In the *Carrieton district,* a number of lenticular masses of manganese ore were worked many years ago, beginning in 1882. Details of production are not available, but probably most of South Australia's recorded production before 1903 (13,492 tons) was from this district. The Booleunda mine was the largest producer. In 1940-42, some of these old mines, including the Booleunda, were reopened, and two or three other were brought into production, but most of them ceased after a short time because of the low grade of the ore. Most of the 4,884 tons produced during 1940-42 came from Bendleby and Coonatta.

Mining began at the Blinman mine, 30 miles by road from Parachilna, in 1939, and to the end of 1944 production totaled 5,251 tons. Reserves of probable and possible ore were estimated in August 1942 at 7,000 tons, including 3,000 tons of ore of possible chemical grade (45 to 50 percent). Mining of these reserves would involve considerabe expense in development work.

A small deposit has been mined at Martin Well, about 40 miles southeast of Blinman. During 1942 and 1943, 878 tons of ore was produced at the mine.

Western Australia.—Total production from Western Australia has been only 77 tons, which was mined in 1922 and 1924, in spite of the fact that the largest

proved reserves of manganese ore in Australia are in this State.

The great distance of the Horseshoe deposits from the seaboard and the consequent high transport costs have prevented their exploitaton even in wartime. These deposits are 16 miles northwest of Peak Hill and 101 miles by road north of Meekatharra. Reserves have been estimated at 300,000 tons.

Near the southern end of the Tano Range, 70 miles northwest of Horseshoe, narrow lenticular outcrops of ore with a high iron content are found.

In the Phillips River district, numerous samples of pyrolusite have been obtained from Mount Decker and other localities.

Papua.—Papua has been an important producer of battery ore since 1939. Total production up to the end of 1944 was 1,529 tons. The principal producer is the Gomai-Golo mine, 6 miles by track from Kapa Kapa. Ore from the mine averaged 86 percent MnO_2. The Maita-Gola deposit contains ore averaging 78 percent MnO_2 and is a possible source of future production. Samples from other occurrences in the area proved to be very low in grade, but they have not been sufficiently opened up to allow adequate testing.

MOLYBDENUM

Australia.—Molybdenite is produced only in small quantities in northern Queensland and in the New England area in New South Wales. Everton, Victoria, has been the most important center in recent years, but operations have ceased.

Queensland. — Although molybdenite has been recorded in many places in Queensland, the principal centers are Wolfram Camp and Bamford in the Chillagoe district, Wonbah in the Bundaberg district, and Ollera Creek in the Townsville district.

Wolfram Camp is 15 miles by bush track west-northwest of Dimbulah, which is 73 miles west-southwest from Cairns. Molybdenite occurs associated with wolfram and bismuth chiefly in irregular quartz pipes in an east-west zone of greisenized granite about 2 miles long and up to 2,000 feet wide. Total production from Wolfram Camp to the end of 1944 is estimated at 1,337 long tons of molybdenum concentrates.

Mining has been carried on intermittently since 1893 at *Bamford,* 18 miles south of Wolfram Camp, where molybdenite occurs in quartz pipes. The productive area is 1.5 miles long, and future production will be largely limited to pipes already opened to various depths. One pipe was worked to a depth of over 600 feet, and others to 300 and 400 feet. Total production of molybdenum concentrates is estimated at 170 tons, of which 102 were produced from 1914 to 1919.

At Khartum, 21 miles south-southeast of Chillagoe, molybdenite-bearing quartz occurs as a series of lenses in quartz reefs in fine-grained granite. The deposits have been worked to a depth of about 100 feet for a production of 30 tons of concentrates. The Kitchener mine treated 986 tons of ore, from which 20.2 tons of concentrates were recovered.

Other localities in the Cairns hinterland from which small production has been obtained include Tinaroo or Glenatherton, 14 miles southeast of Mareeba; Koorboora, 108 miles from Cairns on the Chillagoe Railway; Fisherton or Tate River, 25 miles south-southwest of Chillagoe; Rose's Creek, 12 miles south of Fisherton; and Copperfield Creek, 37 miles south of Einasleigh. A production of 3 cwt. was recorded from Coen in Cape York Peninsula.

Ollera Creek.—Molybdenite is mined at Ollera Creek, about 3 miles by road southwest of Moongabulla Siding, which is 39 miles by rail north of Townsville. The field has been worked intermittently since 1903 for a total of about 22 tons of concentrates. Molybdenite is associated with wolfram and bismuth in joints and pipes in a coarse granite near the contact with quartz porphyry.

Molybdenite is found in the wolfram lodes of the Kangaroo Hills mineral field, about 30 miles southwest of Ingham, and small production has been recorded from Charters Towers and from Ukalunda, about 60 miles southeast of Ravenswood.

Wonbah. — Molybdenite deposit at Wonbah is one-quarter mile west-northwest of Wonbah Siding, 58 miles by rail southwest of Bundaberg. It is 8 miles by road north of Mount Perry. The molybdenite occurs in cylindrical quartz pipe in granite, which has a regular pitch to the northeast of 75 degrees. Development at Wonbah was undertaken under direction of the Controller of Minerals Production in 1943. Ore reserves are estimated at 1,800 tons above No. 3 level, 2,000 tons in dumps, and probable ore to a depth of 100 feet below the No. 3 level at 10,000 tons. Total output from 1917 to 1943 was approximately 98 tons of concentrates.

Development undertaken from 1917 to 1919 on narrow lodes at Mount Bania, 21 miles north-northwest of Mount Perry, yielded 5.3 tons of concentrates. Small production is recorded from Rosedale, 34 miles by rail northwest of Bundaberg.

Molybdenite is found at several localities in the Stanthorpe field near the New South Wales border, but total recorded production is only 13 cwt.

New South Wales.—Molybdenite occurs chiefly in three widely separated areas in New South Wales—the New England district, Yetholme near Bathurst, and at Whipstick in the South Coast district.

The main deposits in the New England districts are at Kingsgate, Deepwater, Bolivia, and Rocky River. The Kingsgate deposits, about 20 miles east of Glen Innes, have been mined since 1883 for a total production to the end of the 1944 of 355 tons of concentrates. Most of the concentrates were produced from 1903 to 1911 (233 tons) and from 1914 to 1920 (88 tons). Since then only a small quantity has been produced annually. The molybdenite is associated with bismuth and is found in pipes in granite near its contact with sedimentary rocks. During recent years the pipes have been worked primarily for quartz crystal with molybdenite merely as a byproduct.

The Deepwater deposits 6 to 13 miles east of Deepwater have produced a total of 241 tons of concentrates. Molybdenite occurs in quartz, greisen, and pegmatite veins in coarse granite near the contact with sedimentary rocks. At least three deposits are worthy of note: (a) The Allies mine, 6 miles east of Deepwater, where one pipe has been followed for 530 feet. In 1939 crude ore was mined from a rich section within the pipe. Crushings yielded 25 tons of high-grade concentrates. Mining operations ceased early in 1942, and the plant transferred to the A. W. mine near Bolivia. (b) The Bow Creek deposit 6 miles east of Deepwater and about 1-¼ miles north of the Allies mine. (c) A deposit has been worked at the Coronation mine, 13 miles east of Deepwater.

The Bolivia deposits are 4 miles south-east of the railway station between Deepwater and Tenterfield. The pipes occur in a coarse granite near its contact with quartz-feldspar porphyry. A small quantity of molybdenite was produced from this area in 1938, but mining ceased at the end of that year.

Rocky River or Wunglebung deposits in this district are 26 miles south-east of Tenterfield. The pipes occur in coarse granite near its contact with porphyries. About 20 tons of molybdenite concentrates have been produced from these deposits.

Yetholme district.—The most important deposits in this district are at Mount Tennyson, 13 miles southeast of Bathurst. Other deposits are found at Gemalla, 2 miles north of the Gemalla railway station, and at a locality 3 miles north of the Tarana railway station. In all of these deposits the molybdenite occurs disseminated in garnet rock in the contact zone between granite and older Paleozoic sediments. At Yetholme, the garnet rock is flat-lying, generally 20 to 60 feet thick, and outcrops over an area of about 70 acres. It contains powellite and scheelite as well as molybdenite. Mining began in 1913 and was suspended in 1919. Output of concentrates during that period was approximately 35 tons recovered from 9,600 tons of ore.

Broken Hill Pty. Co., Ltd., estimates,

as a result of a recent survey, that by hand-picking 15,000 tons of ore containing 116 tons of recoverable molybdenite could be produced in the district. A further possible 160,000 tons of crude ore may exist at depth.

Whipstick.—The Whipstick molybdenite deposits are about 15 miles by road west-southwest of Pambula and 37 miles by road east of the Bombala railway station. Molybdenite occurs associated with bismuth in garnetiferous pipes in a coarse granite near the contact with sedimentary rocks. The deposits were worked from 1912 to 1920, and a total of 112 tons of concentrates were produced. Some recently discovered pipes were prospected in this area, but production was small and operations ceased in 1944.

At Black Range, 6 miles south of Bega, molybdenite of the "paint" variety occurs in three well-defined reefs of massive white quartz.

Small quantities of molybdenite have been mined from other localities, such as 4 miles southeast of Holbrook; Mt. Booroolong, 28 miles north-northwest from Armidale; Hillgrove, 18 miles east of Armidale; Moonbi, 9 miles northeast of Tamworth; Warrell Creek (Nambucca), 6 miles south of Macksville; and at Glen Eden, 12 miles north of Glen Innes. There was a small production in 1941 from Wog Mountain, 22 miles by road southeast of Bombala. Narrow molybdenite-bearing veins occur on South Solitary Island, 11 miles northeast of Coff's Harbor.

Victoria.—The principal producer in Victoria is the Everton mine, 2-½ miles northeast of Everton. Total tonnage mined, chiefly from 1922-1926 and 1937. 40, was 17,212 tons, from which 295 tons of 90 percent concentrates were recovered. Since 1941 mining has been confined to the No. 2 pipe, a larger, lower-grade, and less well-defined ore body 300 feet southeast of No. 1 pipe. Production has been 25 tons of concentrates from 4,377 tons of ore. The mine is equipped with a plant but has been closed since September 1944. Ore reserves of several thousand tons containing 0.5 to 0.6 percent MoS_2 are found in each of the pipes.

Other localities include Thologolong, 35 miles by road east of Albury; Simmon's Gap, 12 miles southeast of Bright; Wangrabell, 10 miles northwest of Genoa; Mt. Moliagul, 12 miles by road north of Dunolly; and Mount Douglas, 4.5 miles east-southeast of Korong Vale; Maldon; Mount William, 6 miles north of Lancefield; and at Monkey Creek, Cheviot, about 8 miles southeast of Yoa.

Tasmania.—Molybdenite occurs in small quantities at Mount Stronach, about 4 miles southeast of Scottsdale; Mount Remus, about 15 miles south-southwest of Moina; and on King Island in the tin-wolfram-bismuth lodes of the Moina district. There has been no production from Tasmania.

South Australia.—Molybdenite has been found in numerous localities in South Australia, but the only production has been as a byproduct of copper mining at the Yelta mine near Moonta, about 125 miles northwest of Adelaide. Production was 1.3 tons from 1917 to 1919.

Western Australia.—The Mount Mulgine deposit is the only important molybdenite occurrence in Western Australia. Production of concentrates from the mine totaled 6 tons from 1917 to 1922. Many small occurrences have been recorded in Western Australia, all of which are confined to granite or greisen areas. Of these, the only deposit of any importance is that at Dandalup in the Darling Range, about 50 miles from Perth.

Northern Territory.—A few hundredweights of molybdenite have been obtained from Yenberrie, 23 miles southeast of Pine Creek, where it is associated with wolfram.

It is estimated that the total molybdenite concentrates produced in Australia is approximately, 2,782 tons, valued at £733,902.

II. INDUSTRIAL MINERALS

ABRASIVES

Japan.—In August 1946, there was a decided upsurge of production of vitreous and elastic bonded grinding wheels as 14 factories resumed production. In Septem-

ber, production increased another 10 percent. Of a total 46 factories, 38 were operating.

Output of abrasive cloth and paper increased, but production of abrasive grains decreased in August. The resin shortage prevented the manufacture of waterproof abrasive paper. In September, because of limitations placed upon the use of electric power, output of abrasive grains decreased still further, and, owing to the shortage of coal and glue, production of abrasive cloth decreased 24 percent. (Reports on Non-Military Activities in Japan, SCAP, September and October 1946.)

CLAY

Germany.—During November 1946, R. G. Wayland of the Office of Military Government for Germany, visited the Grossalmerode clay operations. His report on the condition of this company is abstracted in the following paragraphs. Since November, the entire operation has been shut down for extended periods because of lack of coal and electricity, but when warm weather returns it is expected that adequate fuel will be available.

REPORT OF VISIT TO VEREINGTE GROSSALMERODER THONWERKE BY RUSSELL G. WAYLAND

This clay producer in Kreis Witzenhausen, 25 kilometers east of Kassel, is widely known in world commerce for its glass-pot clay. It is, the only clay producer in the world specifically mentioned by name in U. S. Tariff Commission publications on duties. This company operates three clay mines, an "osmose" plant for special purification of some of their clay, and a refractory plant at Pommerode including a small brown-coal power plant. Total employment is about 130 men, half underground workers. Dr. Kruepe, Direktor, remains with the company from prewar years and is assisted by an adequate technical staff.

Mine production. — Operations were resumed in 1945 and reached almost the present rate of 1,150 tons of salable or usable clay per month by March 1946. The Salzmann mine has been producing ordinary fire clay (silica, 55 percent; alumina, 38 to 41 percent) at its capacity of 600 tons per month for some time, with all its output consumed at the company's refractory plant at Pommerode. The other two mines, the Lengemann and Fallboch are for glass-pot and osmose clay (silica 75 percent, alumina 21 percent) and are not working at capacity, putting out only about 500 tons per month instead of their combined capacity of 1,200 tons per month. One reason is that at the present ceiling prices, all production of glass-pot clay is at a loss, although the refractory production is profitable.

Mining method and conditions.—Underground inspection of the Fallboch mine showed large reserves of uniform clay, a simple top- slicing mining method, experienced miners, and good ventilation, temperature, and humidity. Timber requirements are only moderate. Shafts and haulageways are brick-lined inside circular or oval steel frames. Auger-drill holes are blasted with Donarit No. 1 to spring the clay before it is mined with axes and broad-blade picks. Tramming is by hand. The sump pumps need operate only 2 hours daily. There is no silicosis hazard underground, only in the grinding mill for burnt clay. The miners need new work shoes.

Clay treatment plants.—Mineral impurities in the clay of the Lengemann and Fallboch mines are primarily sand, pyrite, and marcasite. Sandy clays are left in the mine in place or as backfill. Most clay is merely hand-picked of its pyrite on picking belts and then is pressed, raw or ground, into blocks and is either dried or burnt. If burnt, it will be ground by either the company or the customer. Some clay goes to the osmose plant, an unusual type of plant for the purification of clay by electrical means. In this plant a slurry made of clay and sodium hydroxide electrolyte enters a 6-foot trough-like anode tank is which there is an 18-inch-diameter, horizontal, revolving cathode. The pyrite and marcasite remain in the anode bottom, and the clay is scraped from the cathode, pressed raw or ground, and then dried

or burnt. Fuel for drying or burning comes from a brown-coal mine at the edge of town.

SALT

Denmark.—On January 30, 1947, the Danish American Prospecting Co. announced further development in the salt explorations that it is making in Denmark. (See *Rocks and Minerals* April, 1947, p. 324).

The seventh additional core-drill hole in the vicinity of the recently discovered Verjrum salt dome was nearing completion. Two completed drill holes reached the salt mass at depths of 790 feet and 740 feet and penetrated salt to their final depths of 993 and 2,100 feet, respectively. Drilling on the seventh hole has progressed to a depth of 811 feet. Of the remaining test holes, two were initiated to obtain further geological information and two have been abandoned because of mechanical difficulties.

One American and 16 Danes are employed in the drilling operations. At the same time a seismograph crew with headquarters in Viborg, has been working continuously in North Jutland. Five Americans and 18 Danes were assigned to this work. Another party consisting of two Americans and nine Danes are conducting a detailed gravity survey of the island of Zealand. A total staff of 10 Americans and 77 Danes is employed in all branches of the organization.

Exploration work, especially drilling operations, has been retarded somewhat by shortages of equipment, shipping difficulties, and strikes in the United States. One complete drilling outfit, with derrick for drilling to 8,000 or 9,000 feet, and a semiportable rig designed for drilling to depths of about 5,000 feet are reported to be on order or already enroute to Denmark. It is expected that both rigs will be in operation before the middle of 1947.

With the installation of the new equipment, in addition to the portable rig now operating at Vejrum, the company plans to conduct a comprehensive exploration program guided by the results of its detailed geophysical and geological investigations. (Foreign Service Clerk Bernice Hemmingson, Copenhagen.)

SEMIPRECIOUS GEMS—PEARLS

Japan.—More than a million naturally grown Japanese pearl oysters were harvested at Ago Bay, Mie Prefecture, on September 8 and 9, 1946. Three thousand persons, including about 1,000 women divers, were employed. The oysters were collected for pearl culture in 1947. (Report on Non-Military Activities in Japan, SCAP, September 1946.)

SODIUM COMPOUNDS

Union of South Africa.—Because of the critical world shortage of soda ash, a survey of the alkali situation in the Union of South Africa was made in December 1946, resulting in the following report:

The only known source of sodium carbonate in the Union is worked by the South Africa Alkali, Ltd., Johannesburg. The deposit, generally known as the Pretoria Salt Pan, lies about 26 miles by road northwest of Pretoria, Transvaal Province. It occupies an extinct volcanic crater in the Bushveld red granite. In early days the crater was an important source of salt for the natives and settlers, and it also was a salt lick for the vast herds of antelope and other wild game that once roamed this region. In 1912, the Government leased the deposit, and shortly thereafter soda ash was obtained commercially from the brine.

The floor of the crater has a diameter of about 1,400 feet, and the rim rises above the floor from 250 to 400 feet. Percy A. Wagner of the Union Geological Survey has shown that this depression is a sunken caldera, and the sequence of events in its formation included (1) updoming of the granite, (2) drilling of the vent in a series of volcanic explosions, and (3) subsidence of the interior of the volcano with a ring-shaped fault.

Boreholes show that the crater is filled with alternate layers of mud and granite breccia. The mud contains a brine containing sodium chloride, sodium carbonate, and a subordinate quantity of sodium bicarbonate. In the center of the crater, alternate layers of mud and trona

are present, and below is gaylussite 5 to 8 feet thick interbedded and underlain by saline clays and marls. One borehole was sunk to a depth of 250 feet in the crater, but no important quantities of salts were found below the gaylussite layer. The gaylussite layers are impregnated with soda and salt brine, and it is upon this brine that the soda production has been established.

Currently (reported the latter part of 1946) the plant of the South Africa Alkali, Ltd., is producing about 300 short tons of salt and 200 tons of soda ash per month. The percentages of the salts in the brine is decreasing each year, and the reserves of sodium carbonate are limited.

The plant equipment is about 28 years old, and as it was second-hand when installed, considerable repairs are necessary to keep it in operating condition. An average crew of 24 Europeans and 150 natives is employed.

,The soda ash produced in the Pretoria district is not enough to satisfy the requirements of the Union, and most of its needs in recent years have been obtained from the Magadi mines in Kenya. In Great Britain, the soda ash is derived from salt, but, owing to the coal shortage, the country has had to curtail its manufacture and increase imports, chiefly from Kenya. Other countries, which formerly imported soda ash from Britain, also are making demands on the Magadi mines, with the result that the Union's quota has been reduced greatly.

At the Pretoria salt pans the brine is tapped by sinking boreholes to an average depth of 40 feet to the gaylussite layer. From these boreholes, the brine is pumped to a central sump, from which it is pumped to a reservoir on the rim of the crater. From the latter, the brine flows by gravity to a multipleffect evaporator. About 50 percent of the crystallized sodium chloride is removed from the saturated solution by centrifuges. The mother liquor from the centrifuges passes to a cooling tower, where it is cooled to atmospheric temperature. It is then passed to a tank and thence to concrete coolers, where it is cooled further to a temperature of about 20° F. by ammonia coils. Washing soda crystallizes out and, as it contains some silt, passes to melters and is then filtered. Monohydrate is produced in a vacuum pan and is then calcined, resulting in a product containing 97 percent anhydrous sodium carbonate, which is sacked for shipment.

The mother liquor from the decahydrate centrifugals passes through a precooler, and then it goes to a tower for cooling to atmospheric temperature. It is than causticized with lime and returned to the feed of the multiple-effect evaporators.

VERMICULITE

Union of South Africa.—The output of vermiculite in the Union of South Africa is increasing. The reserves of this mineral in the Palabora and Messina districts, Transvaal Province, total about a million tons. As the demand for the exfoliated product in the building trades overseas is growing, the output of vermiculite is expected to increase materially. This increase, however, is predicated on keeping the landed costs at the marketing centers low enough to compete with competitive materials used in insulation, sound-proofing, lightweight concrete aggregate, and similar purpose. At present, vermiculite mines in the Union of South Africa are operating at capacity.

In the first 9 months of 1946, production of vermiculite totaled 2,859 short tons, compared with 1,932 tons in the first 9 months of 1945. (Minerals Attache William O. Vanderburg, Pretoria.)

III. MISCELLANEOUS INFORMATION

AUSTRIA

Mineral industry.—The mining industry of Austria was at an extremely low point, with many of the mines closed, when the Allies entered the country in 1945. A tremendous impetus had been given to the industry under the Germans until the spread of their conquests gave them access to resources elsewhere which could be more cheaply exploited. The Allied authorities immediately instituted measures to resume pro-

(Continued on page 537)

AN AMATEUR PALEONTOLOGIST IN EUROPE
PART 3—BELGIUM

BY HARRELL L. STRIMPLE
Bartlesville, Okla.

The trip across the English Channel was quite uneventful. It was made at night, the weather was mild and in spite of "submarine rumors" I slept all the way. We landed on the beaches and had our first view of the utter devastation of "all out" war. In a short time we drove to "20 Grands" staging area and due to "red tape" began to think we were going to stay there, however, the next day we obtained clearance and made it into Paris that night. Everyone was surprised that we managed to get all three of the English design semi-trailers through safely, they were so top heavy that the slighest sharp turn at any appreciable speed would put them on their side. Since we were on a "working status" it was impossible to find billets other than the barn-like transit hotel. The next day the sergeant in charge managed somehow to get us into a hotel for "leave troops." The Arc d' Triumph was in plain view from our window. Our lieutenant in charge liked the place so we stayed for five days, on working orders.

Paris is a beautfiul city with massive buildings, great avenues and all of that but none of us cared too much for it. I was there on two other occasions and never changed my original opinion. Perhaps the language had something to do with it, however we were to have language difficulties for the rest of our stay over there. Perhaps it was lack of food in public places and the lack of honest gaiety. No doubt the city would have much more appeal in peace times but it could never compare with Brussels—our next station.

How the 815th Signal Port Service Company ever managed to get stationed in Brussels and stay there remains one of the greatest mysteries of the war. Of course we were on duty most of the time there, first in connection with the small sub-headquarters and later with Chanor Base Section when they moved up from Lille, France. Our section built a radio repair shop right in our billets and managed to keep busy, in fact we had more work on actual army equipment than we ever had in Glasgow, Scotland.

Our billets were a large wing of a small brick building in a portion of Brussels known as Laeken. A dark-room was soon established in a portion of one room and we were soon familiar with such names as "Agfa" and "Gaeryet." In England there was a firm known as Johnston sharing with the English Eastman in popularity. Weather conditions were ideal for photography and anywhere one looked there was a potential picture.

Through regular Army Postal channels I tried to reach some one at the Royal Museum of Natural History, which was a mistake for it was two months before a reply reached me. The letters must have cleared back through New York. The Museum was in another part of the city but eventually I found time to reach there during the week and was warmly received by Prof. F. Demenet, Curator of the Carboniferous Collections. We spoke of mutual friends and various geological matters. Apparently he was satisfied for he offered the services of one of his assistants for field trips.

My main interest was to find some of the famous crinoids of the Tournesian (Mississippian). There were large collections made by Pierre, de Kononick, and others from near Tournai and it seemed impossible that the locations were unknown—actually I thought it must be an error in understanding when so advised by Prof. Demenet. Collectors of several years ago were apparently very jealous of the location of their collecting spots and the secret died with them.

Coal Mine Near Mons visited

Our first trip was to a coal-mine near Mons, Hornu-Wasmes, pits 7 and 8. A letter from Demenet had to be presented by Mr. Josef Verbist to a "Direktor" of the company, then a walk to the work-

ings. The Engineer in charge of the mines was quite pleasant and showed us his charts of the area, had me sign a slip relieving the company of any responsibility —just in case—and turned us over to two miners. Work clothes were issued to us and small lanterns. From the time we reached the cages and crouched in them for the downward trip, until we stepped out again at the surface, quite some time later, I was from uneasy to clear disturbed. I have no desire to enter any mine again.

Exactly how far we went down escapes my memory, something like 150 meters. The main tunnel looked about as anticipated, the next tunnel off not so good. Beams had given away here and there and new ones placed in under the new lower level, and it was necessary to stoop rather often to keep from bumping into the old broken beams. We eventually came to a slit-like affair in the wall, approximately four feet deep. There were lights to be seen down below and the sound of pneumatic hammers. This was the actual workings for a single vein of coal, slanting roughly at a 25°—35° angle. There was a metal chute which we slid on only occasionally, the rest of our trip was bracing feet on the short supports and sliding on the rock or coal. Periodically we would pass a miner hugging the wall to give us passage and occasionally we would come to a place where it was almost possible to stand up. It was very oppressive and the hiss of air from the air pipe only made it bearable. I operated one of the hammers and still have a piece of the coal taken out.

Eventually we came out in the adjoining pit at a lower level and walked back to the elevator or "cage'." On the way we briefly examined some of the exposed marine phases. The coal itself is known as "Petit Buisson." the marine phases as "Niveau" a part of the Westphalian (Pennsylvanian), designed on European charts as Upper Wn^3a.

Quarry near Soignies visited

A few weeks later saw us on our way to Soignies. There were Sgt. Dueber, Josef Verbist and a young student from the University, Mssr. Jean Squilari. We all had our lunches and stopped at a local cafe for several bottles of beer to take along. The quarry was Carriere du Hoinaut, only a short walk from town. A stop was made at the "bureau" while Josef obtained the necessary clearance and we looked over the collection of tusks, teeth and similar material collected from the Quarternary clay overburden.

The rock being quarried is known as "Petit Granite" and is considered the best building stone in Belgium. The horizon is known as Tn_3b—upper Tournesian (Mississippian). This particular quarry is the largest in the country and really is quite a hole. In the upper portion are knob-like structures which are apparently eroded remains of the original strata, and Quarternary clay was later deposited over and around the domes. The fossils were silicified and most difficult to remove. In a slightly different strata normal faunas were weathered out free and were in good preservation but there were no crinoids other than fragmentary segments, columnals and other ossicles, A few basal circlets of *Platycrinus* were found and one incomplete dorsal cup of some camerate.

While there we observed their methods of cutting the huge slabs, driving wedges, etc. The large thirty-ton cranes were interesting to watch in action. It was really a pleasant and enjoyable day in spite of missing the main objective.

On the next visit to the museum Prof. Demenet was kind enough to allow me to inspect the collection of crinoids made by de Kononick and that of Pierre. I was most anxious to find a representative of *Graphiocrinus encrinoides* de Kononick and le Hon, the genotype species. A specimen was found so labeled in the collection of Pierre, a beautiful small crown, but the arm structure was quite different. I think it must be an Ampelocrinid. It was decided to try another field trip so Josef and I went to Tournai at an early date.

Quarry at Tournai visited

Our first stop was a "new" quarry (less than 100 year old) Carriere Delwart a' Allain. Fragments of the same dome structure observed at Soignies was found in this quarry, other conditions being similar except that there were not so many

fossils available. A thin trilobite bed was interesting but we obtained no complete specimens. We then went to an ancient quarry on the "Grand Route to Brussels" at Gourain which is zone Tn_2c and contains shists. There were quite a few flattened spirifers about, some crinoid stems, but no crinoids.

By now I had found that a young research scientist, Prof. G. Ubaughs, University of Liege, had all of the Paleozoic echinoderms of Belgium at his disposal so at the first opportunity I went to Liege to see him. His was the same story, the Carboniferous crinoids of Belgium were no longer found. It also seems that much, or most, of de Kononick's collection and types are thought to be in the United States. G. Ubaughs has done some fine work with echinoderms and much more splendid work may be expected from him. He did have a perfect crown of a specimen mentioned though not figured by de Kononick which proved to be the solution to my whole problem regarding that group, and he was so kind as to furnish me photographs and sketches of the little beast.

On another occasion I went to Mr. Verbist's home in Woluwe, a suburb of Brussels, and met his petite wife and two lovely little girls. After enjoying the hospitality of their home, Josef and I went to a nearby sand-pit known as the Laekenan—Tertiary, and tried to collect some fragile echinoids without much success but with considerable enjoyment for we took off our shoes and clamered about with much abandon. The street we followed, and on which Mr. Verbist's home is situated, is Vervoesmstraat and was built by the Romans when that nation controlled all of Europe. It is still very well built and certainly gives one pause for thought when its age is considered.

Some Clay pits visited

For a change in field work I decided to try the Cretaceous. Exact details were given to me and on this occassion I hitchhiked to Mons, catching one of their large inter-village trams at that point for St. Symphorien and walked on to the chalk pits. I was wandering around the place, knowing that it would be well to find a "Direktor" when a fellow approached me and spoke quite fair English. His name was Paul Moisin, a "Direktor" of the place, and he proved quite pleasant and hospitable. He explained that they produced certain chemicals, used as fertilizer mainly, in the plant and ended by taking me to a spot where fossils were abundant. There were not so many complete echinoids, but there were several belemites, a few interesting brachs. I wandered about a bit and found a few more echinoids in some chert beds but they were almost impossible to break out. Traveling was questionable so I started back rather early, well satisfied with the results of the day.

On one other occassion I enjoyed the hospitality of Prof. Demenet at his home but soon after I went on a seven day furlough to Nice, France, for some of the famous Riveria "sun-tan" and shortly after was sent to Cherbourg to join the 816th Signal Service Co. for that long awaited trip home.

These people were all very friendly, helpful and enjoyable. A well known teacher came to our billets to teach us French, for nothing, but the class did not remain plentiful enough to warrant his trouble and we were forced to drop the course. They are quite progressive in many ways and very alert. It was astounding to see the children in our neighborhood learn English almost immediately. The new Natural History Museum is an ultra-modern edifice, almost a sky-scraper. There is a curious and charming mixture of old with the new—the long, sleek Packard passing the dog-drawn cart, the wooden shoes clopping on the cobbles, the tiny trolleys clanging madly down the majestic boulevard and up the narrow winding lane.

I should like to go to Belgium sometime again—and try the acid bath method of collecting silicified fossils which has been developed by Dr. Cooper, Dr. Moore and others. It would be nice to relax in a small cafe and chat with friends there over a glass of coffee. Europeans have attained an ease of living seldom found among Americans.

THE AMATEUR LAPIDARY

THE GREEN DAGGER

BY LUCILLE SANGER
1922 Newport Ave., Chicago 13, Ill.

Speaking of murder, why is it that women have long liked to wear such weapons of offense and defense as bows and arrows, swords, daggers and rapiers as ornaments? Sometimes they have been worn as hair ornaments but more often have reposed on the bosom as brooches.

The latest of these to become fashionable is the Turkish weapon. It is a sort of sword and may be what they laughingly refer to as a "scimitar." Replicas of this instrument of death are found on the counters of ten-cent stores and on the Jewelry counters of department stores. The material from which it is made ranges from some very cheap metal lightly coated with what purports to be gold with a piece of poor glass in the hilt, to fancy decorations made of sterling and gold. This pleasant throat-slitting instrument undoubtedly owes its popularity to its long and graceful curves. We have made one of stone to be used as a lapel pin.

To those who are studiously inclined, the idea of doing a little research might appeal, and the result would probably be a copy of an authentic period piece, not necessarily of the same pattern we have shown here. However, we hope the time never comes when the ladies wear sawed-off shotguns and "typewriters" of gilt and sterling.

To make this dagger, choose a piece of jade. The color of the jade is not so important as it will look well in any shade of green and very well in the black. However, the dagger must be ground thin so that it will not weight the coat or dress and pull it out of shape. Jade is the only stone we can recommend that can be ground thin into this shape and stand a lot of both wheel and hand-work and remain in one piece. Even then, extreme care must be taken to prevent breakage.

Choose a jade slab an inch wide, three inches or so long, and about a quarter of an inch thick. Keep the back flat. The front can be made cabochon or with a sharp ridge down the center with a plane coming up to meet it from the bottom crescent which forms a triangle at the bottom of the blade. The reader is warned that the latter is very hard to cut. We made ours cabochon.

In cutting this stone, it is important to remember that the handle, though curving in the opposite direction to that of the blade, must be made to seem a continuation of the blade. Unless the cutter is careful, it is easy to get the blade and hilt out of line. If the eye is not to be trusted, then it is well to draw an outline on the slab of jade.

This dagger is cut entirely on the large wheel and requires a great deal of care in getting it just right. It is a regular crescent cut for the most part. It is impossible to get the hilt guard completely cut on the wheel and unless the cutter has an immense reserve of patience, it is better not to attmpt this piece because of the great amount of hand-work involved. When the grinding is done, make grooves in the handle to give a twisted effect. These grooves must be slightly curved. When the coarse wheel work is finished, put the stone on the fine wheel and remove the marks of the coarse wheel. It is now ready for the laborious hand-work.

Use small pieces of 220 grit carborundum cloth which have been wet on the back and allowed to dry without being weighted so that they dry flat. These are for cutting and must be of new cloth. Work off all bumps and true up the shape with the cloths. A great deal of work will have to be done to get the twist in the handle just right.

When the hand cutting is finished, use old cloths for sanding. Both the old 220 and finer are good for this.- If extreme care is used, the highlights can be given a good polish on the disk sander. The back should be sanded and polished too.

After it has been carefully washed, it is ready for polishing. This is done, as much as possible on the leather disk with tin oxide. One cannot caution against using too much care to avoid breaking in this stage. It is very easy to catch the handle or the point on the wheel and snap the delicate stone in two. When a high polish has been attained on the dagger, put it on the rock hard felt and polish the indentations with tin oxide. After the back has been polished it is ready for the pin to be attached.

By not setting this stone into a bezel its delicate lines are preserved. Twist some 22 gauge sterling wire, so that there are nine to twelve inches when it is twisted. Anneal, pickle and polish. Make a loop with two tassels as in Figure I. Make the tassels out of fine untwisted wire and use very small balls for the knots above them. Hard solder this to the twisted wire about half an inch from one end. Place this end of the twisted wire (with the loop) to the left of the hilt so that the loop and tassel fall on the right of the dagger just above the guard. This twist of wire goes *straight* across the front of the dagger from left to right. Twist the wire around the handle as in Figure 2, letting the wire fall naturally into the grooves, and running *straight* across the back of the stone. When the wire has been wrapped around the handle, bring it straight down the back and twist it once around the other end so that it will stay firmly in place. Snip off the extra ends and fasten them down with a tiny spot of soft solder.

There are pin backs of cheap metal (we have never been able to get them in sterling) which have safety catches. Use one of these. File off the points which enable the pin back to be used on wood. Use soft solder to attach it to the wires at the back putting the solder in places marked by x's in Figure 3.

Fig. 1 Fig. 2 Fig. 3

Fig. 4

Before using the soft solder, be sure that the wires are clean. Place the liquid flux and let dry. In our experience, the liquid flux is better than the core solder as it makes a cleaner job and a faster job, which is important because it takes less heat. After the flux is dry, let a tiny drop of the melted solder fall onto the wires in the proper places. Clean and flux the back of the pin. Let the flux dry and place the pin carefully on the wires. Fasten to the asbestos pad with staples. The staples also carry off excess heat. Remember that soft solder requires very little heat, therefore use a soft, short (and therefore cool) flame. Pass it gently a time or two over the entire pin, holding it three or four inches away from the stone so that the stone is fairly hot to the touch. Now concentrate the heat on the pin back over the spots of solder until the solder melts. This will be the merest fraction of time. Let the pin remain where it is without touching until it is cool enough to handle. Remove it and wash thoroughly in soap and water. Work the pin prong and the safety catch back and forth so that they act smoothly as they sometimes stick after soldering. Then polish both the jade and silver with a soft cloth.

HOW TO COLLECT MINERALS

BY QUO LAPIS

There are three ways of collecting minerals. All three methods yield a fairly good collection. The first system is known as the "hard way." The second is painless, and the third the most social.

The first way is to pack a bag with a large supply of food, hammers and chisels,, then go out into the field and quarry and collect the mineral specimens. As you empty the bag of food, you add the rocks and minerals. In this way the weight is kept constant, with little muscle strain.

The second method is to use a "silver-pick" and buy them. There is no physical effort involved save licking the stamp and walking to the post-box. Still it might sprain your bank account, but this like a "charlie hoss' will heal in time.

The third system is the one I heartily recommend. The results are staggering. Here is the method in detail. First make the acquaintance of some active collectors, preferably married ones. Then wangle an invitation for an evening. Draw the conversation about to the piles of rocks you have piled in your cellar and how you love them. Invariably "the little woman" will proclaim how their basement is cluttered and what she'd do to get rid of some of the junk piled in the laundry tubs or coal bin. Gradually you steer things until all of you end up pawing over the reserve stock.

Here are a few points to remember. Do not grab the best pieces and let it go at that. No, rave over everything. Wistfully admire some junky quartz or calcite. That will lead to a better assortment. Be reserved and shy, and soon the whole works will be forced on you. Laugh embarrassedly and proclaim that you do not want to rob such a fine collection. At this point boxes and bags will appear and soon you can load the car. After a few such visits you can begin inviting collectors and unload.

Sometimes certain pieces will go the rounds and end up back at home again. The best thing to do in this case is to make a rock garden or build a memory wall. Then you drag Joe (let's call him Joe) out in the yard and say, "Look, Joe, here's that fine piece of quartz you gave me. I put it in the wall for its beauty. I have a chart and can tell just from whom each piece came. Look's good, doesn't it!" Joe will beam and invite you to choose more for your wall. The fact you get some super crystals or rare stuff along with it helps too.

Once I spent a day hauling boulders and cliffs just to reap some pink dolomites. They were nice, but small. Later I stopped by Sam's house (he's another guy) and he gave me a suitcaseful of big ones. Such wasted effort I thought.

A sprained wrist or a bandaged finger helps this system greatly. Right hand, of course. Practise sighing and pensively stroke a hammer. Then Sam or Joe will even carry the stuff to the car for you. I must go now and bandage a hangnail. Sam just phoned he's back in town from a trip, and he invited me to see his loot.

SELENITE OCCURRENCE IN SAUDI ARABIA

At Hofuf, in eastern Saudi Arabia, colorless platy crystals and compact groups of colorless crystals (some with a brownish tinge) of selenite occur on the desert. Some of these crystals are in the collection of Mr. E. Lawrence Sampter, 49 W. 45th St., New York City, which were given him by a friend, Mr. Patrick F. Farrelly, who had personally collected them. These crystals were quite common on the desert and they could be had in many sizes.

From the same desert Mr. Farrelly picked up a nice gray mass of chert (quartz) which is also in Mr. Sampter's collection.

Hofuf, a city of about 30,000, is near the famous Bahrein Islands, in the Persian Gulf, on which are many oil wells.

Mr. Farrelly was one of the head engineers at the oil refinery on the islands, during the late war, and in his spare time he made frequent trips of exploration to various places, including the desert. He brought back many interesting items (including a tropical disease which took many months of doctoring and hospitalization, in Cairo and New York, to recover from).

CLUB AND SOCIETY NOTES

Attention Secretaries—If you want your reports to appear in the August issue, they must reach us by July 20th—the Editor.

Pomona Valley Mineral Club

At the May meeting of the POMONA VALLEY MINERAL CLUB which was held in the Chemistry Building—at Pomona College, Claremont,—Miss Genevra B. Dow spoke briefly on "EMERALDS." This concluded the series of talks on the "BIRTHSTONES OF THE MONTH."

Mr. Earl A. Knie—skilled lapidary member of the Club—gave an interesting resume of the origin of "THE LAPIDARY ART."

The collecting and cutting of beautiful stones goes back through antiquity and tradition to the period of time with which only the archeologists are familiar. Their research has disclosed colored stones of many hues and patterns, whose use was undeniably ornamental and which were used to adorn the person of prehistoric people of whose existence we have only a fragmentary knowledge. From excavations in all parts of the world come beads, pendants, necklaces and other bits of crude jewelry; all using the same minerals, in the rough, from which today we cut our glittering faceted gems and cabochons.

From the sacrificial cenote or pool of the ancient Mayans of Yucatan have been recovered ornaments of gold, jade and precious stones. From Assyrian graves, from Egyptian tombs, from long buried cities of the birthplaces of civilization, from a hundred archeological sources come the evidence of the use of the gem stone for ornamental use. From the wilds of Africa, from ancient Babylon, from Pompeii, from the Indian burial mounds come our proofs that the use of mineral stones for personal adornment began almost with the history of man. From ancient scrolls, in the works of the Fathers of the Christian Church, in Buddist writings, and in the lessons of the wise Confucius come mention of various "precious stones."

Mr. Knie touched upon this antiquity of the gem stone merely to provide a background of historical interest for those interested. To all laymen it means nothing; and it is probable that Milady, proudly wearing her jade dinner ring, cares not one iota, that three thousand years ago similar jade was laboriously transported crudely over the old caravan routes to be made into ornaments for long dead emperors of China. Nor does the modern owner of a brilliant diamond give a thought to Shah Runk who suffered the torture of burning oil upon his shaved head rather than surrender his beloved Kohinoor diamond, now one of the jewels in the state crown of the Queen of England.

But to the true collector of gem stones, no matter how humble or small his collection may be, will start a train of thought, of retrospection; it will bring to mind traditions and old legends, for the true collector of the precious stones must acquire as great a knowledge of his subject as possible through the reading of the many fine books available to him.

One of the first, and without doubt, the most often raised objection from would-be collectors, is that of expense. Mention "precious stones" to him and the average person immediately thinks in terms of rubies, diamonds, emeralds and sapphires. These do cost plenty but they are only a very small part of the gem family. There is nothing to hinder a man or woman of small hobby budget from getting a fine collection of gem stones after learning the best sources of material and he or she has made a few good connections and acquaintances among other collectors. Of course, this takes a little time and patience, but the results are well worth the trouble.

Mr. Knie pointed out some of the do's and don'ts for successful cutting and polishing of cabachons. His representative display of finished gems showed the artistry and skill he has attained in his hobby.

Newly elected officers are: President, Fred Kroger; Vice-President, Glen Weist; Secretary, Mrs. James A. Kryder; Treasurer, David C. Grover; Board Member, Hollis B. Page.

Our thanks to Miss Genevra B. Dow for the interesting programs during the past year.

Edythe M. Thompson, Pub. Chm.
Pomona, California

Northern California Mineral Society

Two meetings of the Society were held during May, 1947. A business meeting was held on the 8th at 422 Belvedere St., San Francisco, and a general meeting on the 21st at the Public Library in San Francisco.

Mineralogical Society of So. California

A regular meeting of the Society was held on May 12, 1947, at the Public Library, Pasadena, Calif. The speaker was W. Scott Lewis, well known mineral dealer and lecturer of Hollywood, whose subject was "Geology and Natural Science of Sequoia National Park."

Mineralogical Society of Arizona

The jamboree meeting of the Society was a special event. It was held on May 25, 1947, in the South Mountain Park, Phoenix, Ariz.

The meeting started at 7:30 P.M. when Russ Kelly told the assembled group the history of South Mountain Park, the largest municipal park in the United States. Then Bob Bale, as Master of Ceremony, took over for the rest of the program.

Central Iowa Mineral Club

A regular meeting of the Club was held on May 2, 1947, in the Administration Bldg., Drake University, Des Moines, Iowa. The speaker was F. A. Brown, whose subject was "Some Interesting Crystals."

A field trip was held on May 4th to the gravel pit just north of Adel on Perry road.

Nebraska Mineralogy and Gem Club

A regular meeting of the Club was held on May 27, 1947, at the Joslyn Memorial, Omaha, Nebr.

The program was in the hands of Sharpe Osmundson, C. D. Hutchens and Robert Berry (publisher of *Earth Science Digest.*) These three rockhounds, who recently returned from a field trip to Wyoming and Western Nebraska, exhibited specimens collected and discussed them.

The Club has held its second exhibit of craftsmanship in gem stones at the Joslyn Memorial during May 4-31, 1947. It attracted considerable interest and discussion.

Rocks and Minerals Club of Woodstock, Vt.

The newly formed Rocks and Minerals Club of Woodstock, Vt., holds its meetings on the 1st and 3rd Fridays. The program being developed is as active and educational as possible.

The 3rd regular meeting was held on May 2nd, 1947. At that time a field trip to the old copper mine region near Chelsea, Vt., was scheduled for May 31st.

At the 4th meeting, held on May 16th, the program consisted of a discussion of methods of indexing, cataloging and displaying specimens.

In the future, a public evening, more field trips, speakers, club contacts, museum visits, a sale and display, and study groups will be scheduled.

We welcome correspondence from all interested.

Ronald W. Gallup
Club Supv.
Woodstock, Vt.

Ramona Rock Club

During November, 1946, a gem and mineral display was exhibited by Mrs. Chas. F. Harper, Box 95, Ramona, Calif. The object of the display was to find out how many rockhounds there were in and around Ramona and if they would be interested in forming a club. Names were obtained of all interested and on March 10, 1947, they were invited to meet and form such a club—the club was formed by 20 charter members and its name is Ramona Rock Club.

The first regular meeting was held on March 24th, 1947, at the home of Mr. and Mrs. Chas. F. Harper. Plans for future meetingts and field trips were made and discussed.

Mrs. Chas. F. Harper

Eugene Mineral Association

The Eugene Mineral Association has just completed its first year. It was started one year ago with but seven members and now has over fifty members. We owe a great deal to Dr. Warren D. Smith, and Dr. Lloyd Staples of the University of Oregon staff for the untiring aid to the Association.

We meet the first and third Wednesdays of the month at 7:30 p.m. at Condon Hall on the campus. Visitors are always welcome and with the summer hunting season about here we hope to have many of them from everywhere.

Our officers are Mr. M. G. Woodward, 2702 Portland St., Pres.; Mr. Harry Rhorer, 1310 Arthur St., Vice Pres.; and Mrs. R. C. Bale, 2099 Riverview St., Sec'y.

There are some very nice Zeolites to be had in and around Eugene. Many nice beach agates are found on our beaches. There is also petrified wood, and of course our eastern Oregon nodules.

Mrs. R. C. Bale, Sec'y.
Eugene, Oregon

Chicago Rocks and Minerals Society
April Meeting

The Chicago Rocks and Minerals Society held their April meeting at the Sauganash Field House. In spite of the weather a large group turned out to hear Dr. Williems. With the assistance of slides, Dr. Willems gave a very interesting review of his new book on faceting which will be on the market very soon. As a result of his talk, more and more of our members have been inquiring about faceting and would like to attempt it, for with the assistance of Dr. Willems Fish-Tail Dop Stick and Jam Peg, it seems so simple as compared with the more highly mechanized equipment.

This meeting was the last to be held at the Sauganash Field House.

May Meeting

The Chicago Rocks and Minerals Society held their May meeting at Green Briar Park Field House. Mr. J. L. Kraft gave us a review of his new book "Adventures in Jade which will be on the market June 6th. He told of his love for Jade and his unceasing efforts to locate deposits of Jade in the United States. To support his talk, he brought a large display of Jade in all colors. We found it so interesting that many of us will be buying a copy of this book. By-the-way, the proceeds from the sale of the book is in a trust fund for needy charities.

The large attendance more than filled the new meeting room. All visitors are welcome and if our present room is not large enough we will ask for a larger one. Our members and friends were glad to hear that our work shop has been reestablished at Green Briar Park on Tuesday and Thursday evenings under the capable leadership of our president, Mr. G. C. Anderson.

R. F. Beach, Pub. Ch.

American Gem Society
(Northern Ohio Guild)

A regular meeting of the Guild was held on May 13, 1947, in the Hatch Building, Western Reserve University, Cleveland, Ohio. A lecture by Dr. Henry F. Donner, of the University, was the main feature. His subject was "Double Refraction and Pleochroism."

Joliet Mineralorist Society

The Society's 16th annual field trip will be held on June 22, 1947 to the Wilmington Strip mines where occur excellent fossil ferns.

Colorado Mineral Society

The annual variety meeting was held on May 2, 1947, at the Colorado Museum of Natural History, Denver, Colo. A feature at this meeting was a new technicolor sound film "The Story of Colorado," presented by James Rose Harvey, Assistant State Historian and President of the Colorado branch of the American Pioneer Trails Association.

A field trip to Sterling, Colo., where fine light-blue barite crystals occur was held on May 18th.

Mineralogical Society of the District of Columbia

A regular meeting of the Society was held on May 16, 1947, at the U.S. National Museum, Washington, D. C. The chief features were talks by James H. Benn (on mineralogy) and Capt. Chas. W. Cox, U.S.N.R. (on "Hobbies and Hobby Craft in the Navy").

New Jersey Mineralogical Society

A regular meeting of the Society was held on May 6, 1947, at the Plainfield Public Library, Plainfield, N. J. The speaker was Ernest A. Maynard, of Jamaica, N. Y., whose subject was "Chalcedony Minerals of Florida."

North Jersey Mineralogical Society

A regular meeting of the Society was held on May 8, 1947, in the Paterson Museum, Paterson, N. J. The speaker was Peter Tyahla who gave his third and final lecture on "Gems and Gem Crystals in Optics and Jewelry."

Newark Mineralogical Society

A field trip to the zinc mines at Franklin, N. J., and to the McAfee limestone quarry at McAfee, N. J., was held on May 25, 1947.

Boston Mineral Club

A regular meeting of the Club was held on May 6, 1947, at the American Academy of Arts and Sciences, Boston, Mass. The speaker was Prof. Frederick K. Morris, of Mass. Institute of Technology, whose subject was "Tectities."

A field trip to the pegmatite quarries in the Alstead-Gilsum-Marlow region of New Hamshire was held on May 18th.

Pacific Mineral Society, Inc.

The speaker at the May 9, 1947, meeting of the Pacific Mineral Society, Inc. was H. Stanton Hill, instructor in geology and mineralogy at Pasadena Junior College. His subject was "Geology of Mt. Lassen National Park." First, he explained that there are four types of volcanoes. One is the Hawaiian type, in which the lava is very fluid and flows out without spectacular explosions. The second is Strombolian, which is in continuous eruption. Third, the Vulcanian or explosive type. Fourth, the Peleean, in which the lava is very viscous and which emits great volumes of incandescent gases. Mt. Lassen resembles the Peleean type.

With a map he illustrated how a chain of volcanoes is almost continuous around the Pacific Ocean. Starting with the west coast of the United States, he followed the volcanic chain through Alaska, the Aleutians, down through Japan, the Philippines, East Indies, New Zealand, Antarctica, and the southern tip of South America, up the west coast of that continent through Panama and Mexico. Some of these volcanoes are of the tremendous height of 20,000 feet and over.

Mr. Hill then took us on a pictorial tour of the Lassen Park area, showing in beautiful color slides the remainder of old Brokeoff, Mt., an ancient volcano of enormous size, which had completely blown off its top. Chaos Crags were shown, and the tremendous flows or avalanches of rock that came from this vicinity and dammed up streams and valleys, forming some of the beautiful lakes of this region. He then continued with the discussion of the eruption of Mt. Lassen in 1914-1915, showing what had occurred and explaining how it happened. Mr. Hill had an excellent display of various types of lava and volcanic rock; also pictures of the eruption in different stages.

After the very interesting lecture, members of the Society lingered late, asking questions and looking at pictures and volcanic specimens.

Mrs. O. C. Smith.
Publicity Chairman.

New Haven Mineral Club Field Trips for 1947

The assembly point will be Peabody Museum, New Haven Conn., at 9:00 A. M.

June 15. Westfield Mass. Trap rock quarry.

July 20. Stafford Springs, Conn. Quartz Crystals.

August 17. Niantic, Crescent Beach, Conn. Moonstones, picnic and swim.

Sept. 21. Bristol, Conn. Copper mine.

Oct. 19. Bedford, N. Y. Pegmatite Quarries.

Anyone interested can go. Contact the Secretary, Miss Grace Vincent, 390 Skiff St., Hamden, Conn.

Los Angeles Mineralogical Society

The Los Angeles Mineralogical Society enjoyed a very interesting and instructive talk by Mrs. Ella Arceniega at its regular April meeting. Mrs. Arceniega's talk embraced the crystal formation of elements and chemical compounds and naturally this can be applied to Mother Nature where we are dealing with like compounds but necessarily of much more complex combinations. She illustrated her talk by showing models of the 6 main crystal formations and stated that there were 32 subclasses possible. Crystal formation depended largely on the mobility and atomic arrangement of matter while their colors were due to the vibration of the electrons. The rapid formation of crystals was shown by making supersaturated solutions of various chemicals such as potasium, dichromate, copper sulphate, silver nitrate, etc. and then suspending pipe cleaners over the solutions with ends dipping in the solutions. In some cases a strip of metal had to be used in place of the pipe cleaner. In most cases a point of supersaturation was only reached by heating the solution and crystals readily reformed as soon as solution started to cool. Mrs. Arceniega climaxed her talk by building a chemical garden by dropping various chemical compounds into a mixture of water and water glass. The various chemicals in breaking up and recrystallizing formed interesting patterns in the water glass.

A. G. Weigel, Pub. Chm.

North Country Mineralogical Club

The North Country Mineralogical Club held its first field trip an Sunday afternoon, April 20, 1947. In spite of somewhat dubious, looking weather, eighteen people were present. We went first to Buttermilk Falls, near Port Douglas, New York. Around the foot of these falls (estimated to be nearly 100 feet high,) beautifully colored specimens of serpentine can be found. After exploring this locations, the group went to Port Kent, when they collected samples of magnetite sand along the shore of Lake Champlain. Most of the members present went on to a nearby gravel pit.

Everyone seemed to feel it a very successful afternoon. We are all looking forward to many more feld trips during this season.

Our April meeting, which had been postponed two weeks because of Easter vacations in the schools, was held at the Plattsburgh Public Library on Thursday evening, April 24th. Mr. William Ellsbury, the president of the club, led a discussion on the first part of Dana's *System of Mineralogy*. Roger Bambard read a paper he had written an the "Lost lead mine, reported to have been found near Willsboro Bay in various accounts written by early settlers in this region. Robert Iverson talked about calcite: what it is, where it occurs, how it is identified, and ways in which it is used.

Following the adjournment of the regular meeting, most of those present went to Champlain College to see the collection of minerals Mr. Arthur Sandiford has had on display there

Gertrude E. Cone, Secretary

Los Angeles Lapidary Society

New officers for the next year were installed at the Annual June dinner meeting of the Los Angeles Lapidary Society, held at the Police Academy in Elysian Park, on June 2, 1947.

They are as follows: John Gaston, president; Ted Schroeder, 1st vice president; Charles Crosley, 2nd vice president; Thomas Daniel, treasurer; Jean Bennett, secretary; and Lelande Quick, historian.

No special program was planned, as all committees gave their annual reports. The winners for the rock hound photo contest will be announced at a later date.

A three day field trip to the Lead Pipe nodule area on May 30, 31 and June 1, was enjoyed by many of the members.

The Society's Address is P. O. Box 2184-Terminal Annex, Los Angeles 54, California.

E. Grace Peters, (pub. chairman)

Queens Mineral Society

The May meeting of the Queens Mineral Society was held on Thursday, May 1st, 1947, at its headquarters 8501—118th St., Richmond Hill, N. Y.

Dr. Otto Trautz addressed the Society on occurrence of the Limestone Contacts at Franklin, N. J., and rendered a most instructive discourse on the geologic aspects of the region.

The forces which acted to produce this highly mineralized locality were traced from their ancient origin, through their successive phases of development, in a most thorough manner.

Dr. Trautz then informed the membership where the most productive mineralized zones occurred, and, the reasons for the presence of certain species in specific zones or areas.

Mr. T. Fredericks, who has spent many years in collecting in the Franklin district related many of the experiences he had encountered in collecting mineral specimens at the various dumps and quarries.

Being gifted with keen eyesight and an unusual power of observation has enabled Mr. Fredericks to obtain excellent specimens from sources generally unproductive to the less experienced collector. Mr. Fredericks illustrated tips on how to recognize and identify many minerals, by selecting examples from a large display of specimens collected in the district. The meeting was brought to a close after many of the specimens had been exposed to a Mineralight.

William Stadler, Sec.

Four Corners Rock Club

This is to announce that we here in Durango, Colo., are going to put on the Four Corners Rock Show, with other hobbies invited, during the Spanish Trails Fiesta, August 8, 9, and 10, 1947.

This Fiesta is a yearly event here and we intend to make this a yearly Rock Show also. The Chamber of Commerce and J Cs push these events and there are always large crowds and with the Rock Show there will be more of interest for all.

All the Rocky Mountain Clubs have been notified and invited to participate, along with a college in New Mexico and the local members to say nothing of the commercials of which there are half a hundred.

H. C. Brockman, Secty.

WORLD'S DEEPEST BOREHOLE BEING DEEPENED.

The world's deepest man-made hole, the Weller oilwell located 5 miles north of Fort Cobb, in Caddo County, of western Oklahoma, is being deepened. This well, being sunk by the Superior Oil Co. of California, was stopped on March 14, 1947, when the drill pipe got stuck 25 feet off the bottom, nearly 3½ miles below the earth's surface. The stuck pipe has been freed and drilling has commenced again. The depth reached, before the pipe got stuck, was 17,236 feet (See *Rocks and Minerals*, April, 1947, P. 306)

We are indebted to Jay E. Gilkey, of Oklahoma City Okla., for the latest informa-

AGATE OCCURRENCE IN MOZAMBIQUE

Near Goba, District of Lourenco Marques, Mozambique, many masses of agate some quite large, are found lying on the surface of a cotton plantation. These masses have been plowed up.

A nice specimen in the collection of the Editor of *Rocks and Minerals* weighs 1¼ lbs. It was obtained from Hugh A. Ford, the New York City dealer, who personally collected it some years ago. It is 2x3x4 inches in size, grayish in color, and has the largest face polished. The exterior surface of this agate is very rough, cellular, and stained brownish red. The beauty of the agate is brought out only when polished.

Mozambique, a large Portuguese possession in southeastern Africa, is also known as Portuguese East Africa.

HOW DO YOU LIKE OUR ADVERTISING SECTION

Over ¾ of the States are represented in *Rocks and Minerals* by dealers and collectors who carry in stock all varieties of gems, minerals, rocks, fossils, lapidary equipment and supplies, books, etc., etc. Patronize these dealers and tell them that you saw their ads in *Rocks and Minerals!*

Bridgeport Mineral Club Field Trips for 1947

The assembly point will be in front of Central High School, Bridgeport, Conn., at 9:00 A. M.

June 11 Roxbury and Roxbury Falls, Conn. —Garnets. Judd's Bridge—Kyanite.

July 13 Bedford, N. Y. Pegmatite Quarries.

August 10 Portland, Conn. Pegmatite Quarries.

Sept. 14 Upper Merryall, Conn. Pegmatite, Uraninite crystals.

Oct. 12 Tilly Foster, N. Y. Iron mine 40 odd minerals.

Anyone interested can join the group. Contact the Secretary, Miss Georgiana Seward, 2859 Main St., Bridgeport, Conn.

WORLD NEWS ON MINERAL OCCURRENCES

(Continued from page 526)

duction but were handicapped by labor shortages and damage to plant and equipment.

Lack of adequate fuel is, next to food, Austria's most serious postwar economic problem. In November 1946, domestic production of hard coal was 64 percent and lignite 75 percent of the 1937 totals, but neither covered more than a minor part of the country's requirements. The petroleum situation was somewhat easier, as the production of the oil wells had been largely increased during the war and should cover fully the country's peacetime requirements with a surplus for export.

Active exploration during the war resulted in the location of several occurrences of mercury, low-grade fluorspar, gold, nickel, and molybdenum, but the deposits appear to be unimportant.

(Counselor of Legation K. L. Rankin, Vienna.)

COLLECTORS—RECORD YOUR FINDS!

This summer a large number of collectors will be out in the field and many minerals will be found. If these collectors should run across any unusually fine or interesting minerals they should send some notes on their finds to *Rocks and Minerals*. These notes would be printed in early issues of the magazine and they would not only be of great interest to collectors in general but they would also record the minerals found. So, collectors, if you should run across any unusually interesting minerals, record them with *Rocks and Minerals*.

WITH OUR DEALERS

Note the long list of fine minerals featured by Schortmann's Minerals, of Easthampton, Mass.

Pre-forms of Brazilian origin is a feature of A. G. Parser, Inc., New York, N. Y.

Mrs. B. F. Nonneman, of Salinas, Calif., has in stock some very nice facet cut gem stones.

Red palm wood and other attractive polishing material may be obtained from S—T Gem and Mineral Shop, of Tujunga, Calif.

Some minerals that were personally collected by Mr. Burnham, of Burminco, of Monrovia, Calif., are listed this month. You should order some.

Robert Tesmer, of Cleveland, Ohio, can furnish a number of gem-rough specimens.

All imported Brazilian specimens and cutting materials is a feature of Kilian E. Bensusan, of San Fernando, Calif.

Harrison S. Cobb, of Boulder, Colo. features the new Queenstone.

Perry's Rock Shop, of Poncha Springs, Colo., announces the first find of Colorado Plume Agate.

In his 13th list of fine minerals from an old collection, Hugh A. Ford, of New York City, lists a number of fine gold specimens.

Something new!—announces the Hodge Podge Shop, of Grants Pass, Oregon.

Chas. O. Fernquist, of Spokane, Wash., lists some more Western Minerals.

Glendale Gem and Lapidary Supply Co., of Glendale, Calif., announces the arrival of The Facetteer!

A new advertister is King Gems, Inc., of Colorado Springs, Colo.—See their ad!

Knowlton Minerals ,of Joliet, Ill., announces that it has sold its business to Anthony Thurston, of Swansea, Mass. Mr. Thurston, proprietor of King Philip Shop, is an ex-G. I., and a member of the R & M A.

Minerals from everywhere are featured by Ward's, of Rochester, N. Y.

Western Mineral Exchange, of Seattle, Wash., can supply many items as mineral hammers, lapidary equipment and supplies, minerals etc.

N. H. Seward, "Opal House," Melbourne, Australia, now has fine Australian Black opals to offer, at various prices, and assorted colors and sizes. List free.

B. Lowe, of St. Louis, Mo., will swap stones for old gold, broken or usable jewelry, etc.

Ed Rochester, of Winterhaven, Calif., has some excellent petrified palm root in stock.

Pyramid Rock Mart has moved from Los Angeles to Barstow, Calif.

After a long absence, Harry Ross, of New York City, is with us again. He has some interesting items.

Maricopa Gem & Mineral Mart, Morristown, Ariz., claim to have found one of the largest agate beds in the world.

Lloyd T. Mewburn, of Banff, Alta., Canada, has a special for this month.

R. H. Hartson, of Winston, N. Mex., lists quite a number of New Mexican minerals.

A new advertister are Earl & Clyde Olmsted, of Saint George, Utah. See their offering!

Thompson's Studio, of Pomona, Calif., have some xlized willemite. Need any?

Another new advertiser is Char-Ben Lapidary Shop, of Paulding, Ohio. "Your material cut to order" is one of their specialties.

Another new advertiser is the Conley Company, of Spokane, Wash. Note their ad!

Have you a Santa Clara Valley jasper? Toupel Brothers of San Jose, Calif., have them in stock.

Arizona agates, jaspers and petrified wood are a feature of Chas. E. Hill, of Phoenix, Ariz.

Two new sanders are featured this month by Grieger's, of Pasadena, Calif.

Three interesting minerals from Leona Heights, Calif., and two good books are featured by Universal Minerals, of Los Angeles, Calif.

Elliott Gem Shop, of Long Beach, Calif., can supply the new Tru-Vue (Third Dimension Picture) and Viewers.

Still another new advertiser is Clark Tools, of Casper, Wyo., who features the new Clark Gem Lapidary Unit.

If you are in need of good Nevada turquoise, contact the Nevada Turquoise Mines, Inc., of Mina, Neva.

BIBLIOGRAPHICAL NOTES

California Journal Of Mines And Geology For July 1946

(pp. 164-310, 12 figs., pls. 23-50)

Two quicksilver reports, representing results of strategic minerals investigations by the U. S. Geological Survey, are published in this Journal: (1) *Quicksilver Deposits of the Western Mayacmas District, Sonoma County, California,* by Edgar H. Bailey, pp. 199-230, 3 figs., pls. 29-33; and (2) *Quicksilver Deposits of Eastern Mayacmas District, Lake and Napa Counties, California,* by Robert G. Yates and Lowell S. Hilpert, pp. 231-286, 8 figs., pls. 34-47.

"The Geysers" fumarolic region in Sonoma County is described in two short papers, (1) *Minerals at "The Geysers," Sonoma County, California,* by M. Vonsen, pp. 287-293, pl. 48; and (2) *Observations at "The Geysers," Sonoma County, California,* by Walter W. Bradley, pp. 295-298, pls. 49-50.

Also included are *Mines and Mining in Tehama County, California,* by J. C. O'Brien, pp 183-195, pls. 23-28; *Administrative Report,* by Walter W. Bradley, p. 172; *Biennial Report of the State Mineralogist,* by Walter W. Bradley, pp. 173-182, 1 fig.; *Current Notes* (Geologic Branch), p. 196; *Progress on Revision of Bulletin 113, "Minerals of California," with Notes on Some New Occurrences,* by Joseph Murdoch, pp. 197-198; *Accessions to the Exhibit,* by Henry H. Symons, p. 299; *Statistics,* by Henry H. Symons, pp. 300-302; *Library Report,* by James M. Little, pp. 303-307; *Services of the Division of Mines,* pp. 308-310; *Publications of the Division of Mines,* pp. i-xix.

Issued by the State Division of Mines, Ferry Building, San Francisco 11, Calif. Price 60c

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The Geologic Interpretation of Scenic Features in Ohio: by J. Ernest Carman.

A little excursion in the field of geology among some of Ohio's most scenic features. The many fine plates and diagrams add considerable interest and value to the text.

Issued by the Geological Survey of Ohio, Columbus 10, Ohio, as a reprint from the Ohio Journal of Sciences (Vol. XLVI, No. 5, pp. 241-83). Price 15c.

Geologic Map of Ohio.

After being out of print for 10 years or so, the "Geologic Map of Ohio" has just been reprinted with minor changes. It is a large map, 32 x 39 inches in size, and can be obtained from the Geological Survey of Ohio, Columbus 10, Ohio.

Geologic Map of the Province of Ontario.

This is a large geologic map which has just been released. It is 36 x 50 inches is size.

Issued by the Ontario Department of Mines, Parliament Bldg., Toronto 2, Canada.

Fifty-fourth Annual Report of the Ontario Department of Mines: Vol. LIX, Part 1, 1945.

The report consists of two parts:-

Statistical Review of the Mineral Industry of Ontario for 1944, pp. 1-55.

List of Quarries and Works for Structural Materials and Clay Products, 1944, pp. 56-62.

Issued by the Ontario Department of Mines, Parliament Bldg., Toronto 2, Canada.

Minerals, Rocks and Soils:

This is Catalog 474 (1947) issued by Ward's Natural Science Est., Inc., Box 24, Beechwood Sta., Rochester 9, New York.

This is an interesting price list of 44 pages featuring minerals, rocks and soils. The minerals (listed alphabetically) appear on pages 5-31, rocks (listed alphabetically) appear on pages 33-43, and the soils on page 44.

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Organized in 1928 for the increase and dissemination of mineralogic knowledge

To stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

Ever since its foundation in 1928, the Rocks and Minerals Association has done much to promote the interest in mineralogy. It has sponsored outings, expeditions, formations of mineralogical clubs and the printing of many articles that have been a distinct contribution to mineralogy.

Those of our readers who are members of the Association can rightly feel that they too were sponsors of these many achievements that have helped to give mineralogy a national recognition. Among your friends there must be many who would like to have a part in the Association's work—to share with you the personal satisfaction, the pleasure, and the benefits of membership. Will you give your friends this opportunity to join the Association by nominating them for membership?

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